

THE COMPARISON OF OCEANIC PARAMETERS  
WITH LIGHT ATTENUATION IN THE WATERS BETWEEN  
SAN FRANCISCO BAY AND MONTEREY BAY,  
CALIFORNIA

Robert Ellsworth Baker



# United States Naval Postgraduate School



## THESIS

THE COMPARISON OF OCEANIC PARAMETERS WITH LIGHT  
ATTENUATION IN THE WATERS BETWEEN SAN FRANCISCO BAY AND  
MONTEREY BAY, CALIFORNIA

by

Robert Ellsworth Baker

April 1970

*This document has been approved for public re-  
lease and sale; its distribution is unlimited.*

T133879

LIBRARY  
PAUL POSTGRADUATE SCHOOL  
MONTREY, CALIF. 93940



The Comparison of Oceanic Parameters with Light  
Attenuation in the Waters between San Francisco Bay and  
Monterey Bay, California

by

Robert Ellsworth Baker  
Lieutenant Commander, United States Navy  
B. S., United States Naval Academy, 1959

Submitted in partial fulfillment of the  
requirements for the degree of

MASTER OF SCIENCE IN OCEANOGRAPHY

from the

NAVAL POSTGRADUATE SCHOOL  
April 1970

## ABSTRACT

Eighty-six oceanographic stations were occupied in the waters between Monterey Bay and San Francisco Bay during the period 7-14 November 1969. Values of beam transmittance, oxygen content, particulate count, and temperature were obtained from the surface to 100 meters. These parameters were analyzed and compared by means of depth profiles, horizontal contours and vertical contours.

The average sea surface temperature during this period was  $14.44^{\circ}\text{C}$ . The northern part of Monterey Bay had the lowest values of beam transmittance and highest values of particulate count. The California Current appears to be flowing southward down the coast at depths above 60 meters and entering Monterey Bay where it sinks to a depth of at least 61 meters. Indications of downwelling are present off the coast between Pt. Ano Nuevo and Santa Cruz, and this is attributed to the northward flowing Davidson Current impinging on the shore and sinking. A layer of maximum particulate count was often found to exist within the thermocline. A fairly good correlation seems to exist between beam transmittance and particulate count. No simple relationship between beam transmittance and oxygen content was apparent. Approximately 74 percent of all particulates observed by means of a Coulter Counter having a 100 micron orifice were less than 6.2 microns in diameter.

# TABLE OF CONTENTS

	Page
I. INTRODUCTION -----	7
A. PURPOSE OF INVESTIGATION -----	7
B. DEFINITION OF TERMS -----	7
1. Beam Transmittance and Beam Attenuation -----	7
2. Particulate Count -----	7
3. Turbid Water -----	7
C. MARINE CLIMATE -----	8
D. BACKGROUND -----	8
E. PREVIOUS INVESTIGATIONS -----	10
II. OBSERVATIONAL PROCEDURE -----	13
A. CRUISE PROCEDURE -----	13
B. EQUIPMENT DESCRIPTION -----	13
1. Beam Transmissometer -----	13
2. Coulter Counter -----	14
3. Sound Velocity - Temperature - Depth Probe -----	14
C. DATA COLLECTION PROCEDURE -----	14
D. DATA REDUCTION PROCEDURE -----	16
1. Sound Velocity -----	16
2. Oxygen -----	19
3. Particulate Count -----	20
III. ANALYSIS OF DATA -----	21
A. INTRODUCTION -----	21
B. TABLE OF SOUND VELOCITY, TEMPERATURE, AND BEAM TRANSMITTANCE -----	22

C.	PROFILES OF PARTICULATE COUNT, OXYGEN CONTENT, TEMPERATURE AND TRANSMITTANCE -----	22
D.	VERTICAL CONTOURS OF BEAM TRANSMITTANCE, PARTICULATE COUNT, TEMPERATURE AND OXYGEN -----	23
E.	HORIZONTAL CONTOURS OF BEAM TRANSMITTANCE, PARTICULATE COUNT, TEMPERATURE AND OXYGEN -----	28
F.	COMPARISON OF BEAM TRANSMITTANCE AND PARTICULATE COUNT -----	29
G.	COMPARISON OF BEAM TRANSMITTANCE AND TEMPERATURE -----	30
H.	COMPARISON OF BEAM TRANSMITTANCE AND OXYGEN CONTENT --	30
I.	COMPARISON OF PARTICULATE SIZE WITH DEPTH -----	30
IV.	CONCLUSIONS -----	32
V.	SUGGESTIONS FOR FUTURE RESEARCH -----	34
	VERTICAL CONTOURS, HORIZONTAL CONTOURS, AND DEPTH PROFILES -----	35
	APPENDIX. BATHYTHERMOGRAPH TRACES -----	115
	TABLE 1. STATION DATA: DEPTH, TIME, LOCATION, WEATHER, SOUND VELOCITY, TEMPERATURE, AND BEAM TRANSMITTANCE -----	120
	TABLE 2. COULTER PARTICLE COUNT AND OXYGEN CONTENT -----	167
	BIBLIOGRAPHY -----	196
	INITIAL DISTRIBUTION LIST -----	198
	FORM DD 1473 -----	205

# LIST OF FIGURES

Figure		Page
1	Stations Occupied During 7-14 November Cruise -----	12
2	Arrangement of Ramsay Probe and Beam Transmissometer -----	15
3	Oceanic Period Surface Water Movement -----	24
4-24	Vertical Contours of Beam Transmittance and Coulter Count, Beam Transmittance and Temperature, and Beam Transmittance and Oxygen -----	35
25-40	Horizontal Contours of Beam Transmittance, Coulter Count, Temperature, and Oxygen -----	56
41-83	Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance -----	72

## ACKNOWLEDGEMENTS

Many people have assisted in many different ways to put this thesis together. I am greatly indebted to Professor Stevens P. Tucker, my thesis advisor, for his endless encouragement and enthusiasm throughout this project. His technical assistance, both during and after the cruise, made many seemingly insurmountable obstacles disappear. I would like to express my thanks to the members of my section - LCDR Baldwin, LCDR Henderson, LCDR Hewitt, LCDR Magruder, LCDR Minugh, LT Musick - who willingly gave of their time and energy during the sea period. Without their help it would have been impossible to make 86 stations in less than seven days. I would like to express my gratitude to Dr. John Phillips of the Hopkins Marine Station, Pacific Grove, California, for the use of the Coulter Counter. The help of Mr. Jerry Norton in determining the oxygen contents, both during and after the cruise, is greatly appreciated. The assistance and extremely cooperative attitude of Dr. Dave Allen and the members of the NAVOCEANO detachment aboard the USNS Bartlett made the data collection phase of this project run very smoothly. Lastly, to my wife Sandy, my sincerest thanks for her encouragement, long hours of copying data and the cheerful manner in which she accepted the neglect of the author during this project.



## I. INTRODUCTION

### A. PURPOSE OF INVESTIGATION

The two primary purposes of this investigation were:

1. To measure values of beam transmittance in the relatively data - scarce coastal waters between Monterey Bay and San Francisco Bay and to compare these with measured values of salinity, oxygen, temperature and particulate count.
2. To compare the results found during this cruise with the results determined during the cruise in May 1969 and determine the changes both seasonally and with different oceanic climates.

### B. DEFINITION OF TERMS

#### 1. Beam Transmittance and Beam Attenuation

Beam attenuation may be defined as the ratio of the radiant flux lost from a beam by means of absorption and scattering. Beam transmittance may be defined as the ratio of the transmitted radiant flux to the incident radiant flux [11,p7].

$$\text{Beam Transmittance} + \text{Beam Attenuation} = 1.$$

#### 2. Particulate Count

Particulate count is the total count of all particulate matter for any given water mass as determined by a Coulter Counter having a 100 micron orifice.

#### 3. Turbid Water

The term "turbid" water is used loosely in this investigation to mean water that contains relatively low values of beam transmittance and high values of particulate count.



### C. MARINE CLIMATE

Skogsborg [19] first described the three-phase annual cycle of the marine climate in the superficial water layers of the Monterey Bay Area. Bolin [5] has named these phases. The Upwelling Period lasts from the latter part of January or early February to September. During this period a temperature of  $10^{\circ}$  or  $11^{\circ}\text{C}$  is normal at the surface, and no clearly developed isotherm is present. This is followed in September, October, and early November by the Oceanic Period, which is characterized by surface temperatures averaging more than  $13^{\circ}\text{C}$ , the warmest of the year, and by a sharp thermocline at a depth of only a few meters. November normally marks the beginning of the Davidson Current Period. During this period the surface waters are slightly cooler and the thermocline weakens markedly as it is depressed to depths between 50 and 100 meters.

### D. BACKGROUND

Until recently, one of the most overlooked oceanic parameters in the routine sampling at an oceanographic station has been light attenuation or beam transmittance. As pointed out by Jerlov [11,p155], optical data can be used in various ways to gain information about oceanographic conditions and, in particular, dynamic conditions. Scattering and beam transmittance measurements supply substantial information about two constituents of sea water, viz. particles and yellow substance [11,p155].

Light attenuation in sea water is caused by both absorption and scattering. This is different from the atmosphere, which is primarily a scattering medium [11,p1].

Scattering in sea water is a combination of the scattering produced by the water itself and that produced by suspended particles with particle size being the major parameter [11,p15]. The scattering by pure water may be considered a problem of molecular scattering. This scattering shows relatively small variations and is affected only by changes in temperature and pressure and may be considered minute [11,p24].

The transmittance of a beam of artificial light is an inherent optical property of sea water.

In the open ocean the clearest water is usually found in regions of converging surface currents and sinking water where the nutrient content is low. Areas of turbid water are usually associated with diverging surface currents accompanied by upwelling of the nutrient fertile deep water.

Several studies have been made of the waters between Monterey Bay and San Francisco Bay in the last several years. Two studies, those of Yeske and Waer [22] and of Bassett and Furminger [3], dealt only with the Monterey Bay area. Two others, the Bay-Delta study [7] and that of Labyak [14], were concerned with the waters from Monterey Bay to San Francisco Bay, with Labyak's being the most extensive study to date dealing with the optical properties of these waters. Labyak took data at 79 oceanographic stations in the waters between Monterey Bay and San Francisco Bay during the month of May 1968, i.e. during the Upwelling Period. The present study is basically an extension of Labyak's in that the same area was looked at with respect to basically the same parameters, but during the Oceanic Period.

## E. PREVIOUS INVESTIGATIONS

Ball and LaFond [1,p24] found that there is a tendency for the turbidity to appear in patches and that internal waves were responsible to a large extent for the patchy pattern that occurs near the thermocline. They also point out that the organisms that make the water turbid commonly have a particular density and, seeking a level at which their buoyancy becomes neutral, they may float on the density boundary of the thermocline.

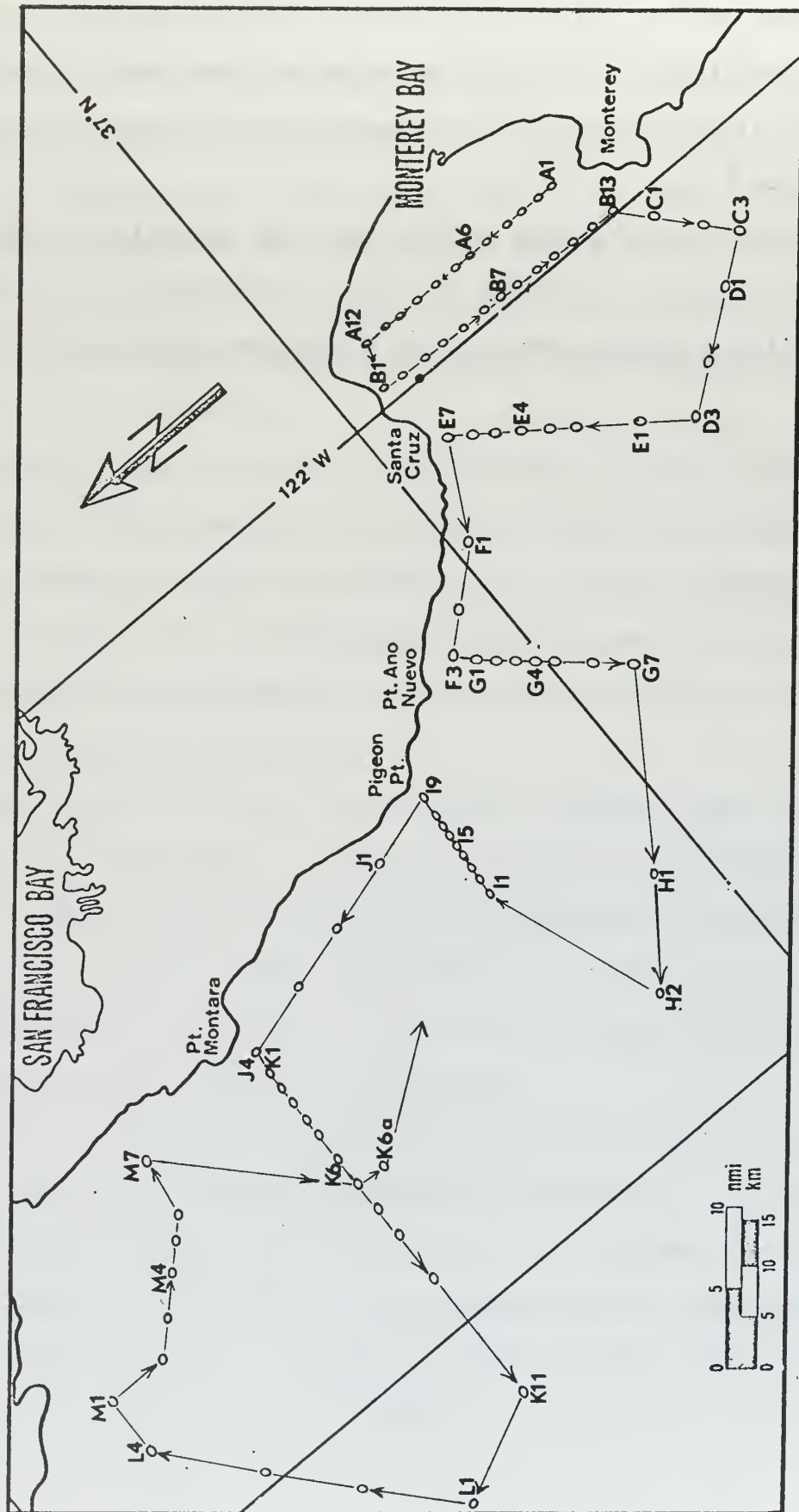
Barham, Wilton and Sullivan [2,p26] observed a layer of maximum turbidity in the thermocline and were able to observe this layer move upward towards the surface during the night. In their investigation they were able to find a definite correlation between the total count of microorganisms and temperature and no correlation between inanimate material and thermal structure.

Beer [4,p51-53], in his study of Redondo Submarine Canyon, concluded that internal waves, causing the suspension of sedimentary material, are probably the most important mechanism operating over the area of the continental shelf. He observed that surface waters contain coarser sediment than waters at depth and that the mean diameters of surface suspended sediment decrease seaward.

Labyak [14,p58] concluded that the majority of particulate maxima were found to be associated with temperature gradients of the order of  $0.1^{\circ}\text{C}/\text{m}$  except in near shore areas and in upwelling water. In his samples taken at 79 stations off the California coast, approximately 90% of particles observed by means of a Coulter Counter having a  $100\ \mu$  orifice were less than  $12\ \mu$  in diameter.

Yeske and Waer [22] in their study of Monterey Bay found that approximately 68% of the particles affecting beam transmittance have Coulter sizes less than  $7.6 \mu$  in diameter, while approximately 96% were less than  $8.5 \mu$ .

Joseph [12,p66] points out that where the thermocline is scattered due to the sea, the turbidity may also be "decomposed", i.e. when the thermocline disappears the layer of turbid water within it also breaks up.



Stations Occupied During 7-14 November Cruise

Figure 1



## II. OBSERVATIONAL PROCEDURE

### A. CRUISE PROCEDURE

During the period 7-14 November 1969 eighty six oceanographic stations were occupied in the coastal water between Monterey Bay and San Francisco Bay. The locations of these stations are shown in figure 1. The exact position, time, and weather conditions of each station are listed in Table 1. These stations were chosen to cover best the coastal waters in the given area in the amount of time available and approximately to cover the same region studied by Labyak in May 1969. The USNS BARTLETT (T-Agor-13) was utilized as the oceanographic research vessel. The cruise originated in Monterey Bay with station A-1 and then proceeded northward, skipping stations K-6a and K-7 because of Navy clearance problems, and ending at station M-7. Stations K-6a and K-7 were occupied on the southward journey back to Monterey Bay. Two teams were used to collect the data continuously on a 24 hour a day basis. The station farthest seaward was L-1, which was approximately 37 nmi from the coast. The stations nearest the coast were approximately 1 nmi from shore. Radar, loran and visual bearings were used to determine the ship's position.

### B. EQUIPMENT DESCRIPTION

#### 1. Beam Transmissometer

A Marine Advisors Model C-2 beam transmissometer (alpha-meter) was utilized for this cruise. This is an instrument similar to that described by Yeske and Waer [22,p15] and used by Labyak [14]. For the safety of the instrument, it was never lowered closer than 15 meters to the bottom.

## 2. Coulter Counter

A Model A Coulter Counter located at Hopkins Marine Station, Pacific Grove, California, was used for this study. The Coulter Counter used is the same one described by Yeske and Waer [22,p17]. It was found, however, that even with the wire mesh screen described by Labyak [14,p31] surrounding the equipment, there was still some outside electrical interference present. A 0.05 microfarad capacitor was placed across the plug to the Coulter Counter. This eliminated all observable remaining outside interference. A gain setting of four was used.

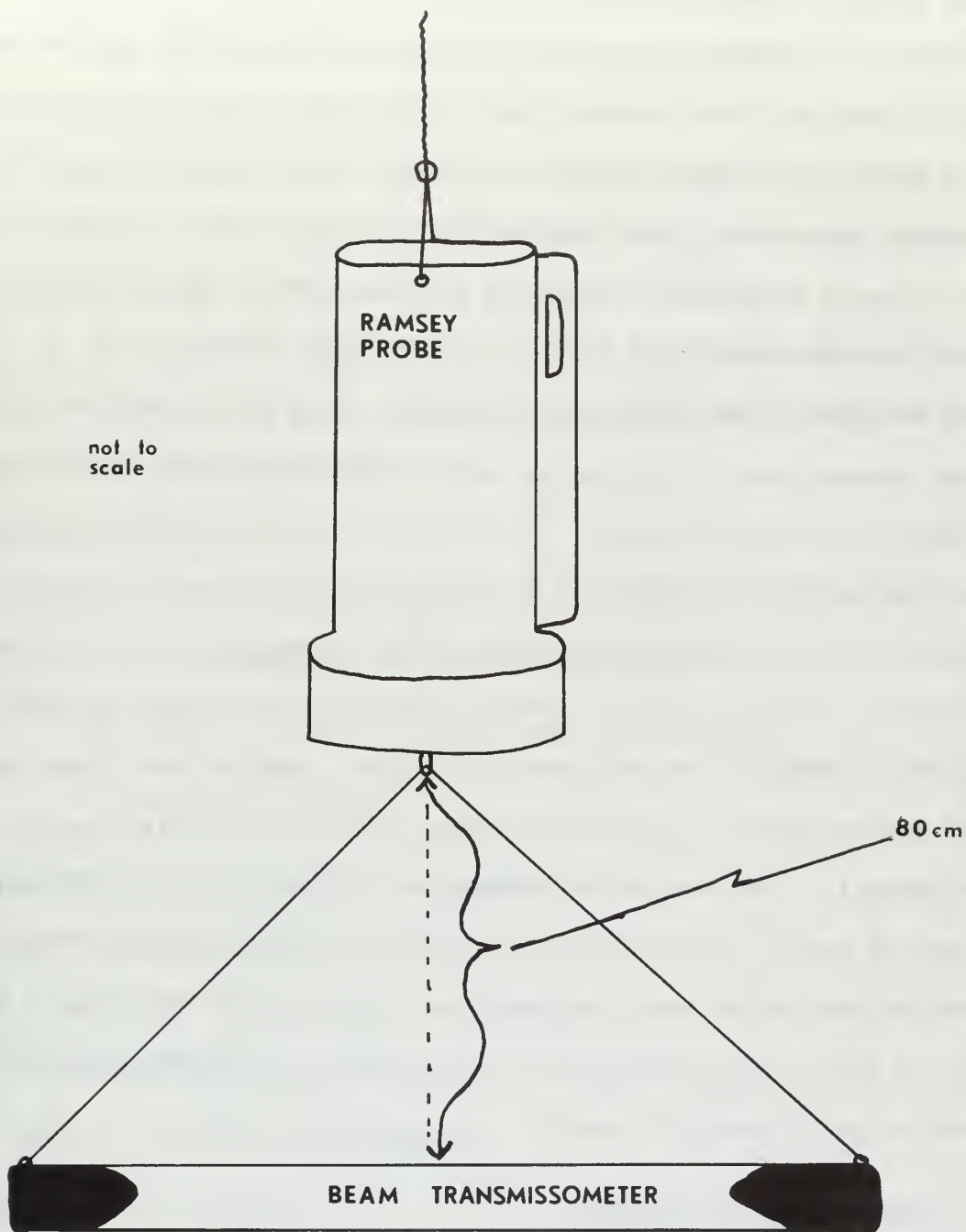
## 3. Sound Velocity-Temperature-Depth Probe

A Ramsay Engineering Company MK-1 Deep Sea Sound Velocity/Temperature/Depth (SV/T/D) probe was utilized at every station during the cruise. This is similar to the instrument used and described by Labyak [14,p26]. It was operated and maintained by the NAVOCEANO detachment aboard the research vessel.

## C. DATA COLLECTION PROCEDURE

At least two casts were made at each station. For the first cast, the SV/T/D probe and beam transmissometer were lowered together. The beam transmissometer was located 80 cm below the SV/T/D probe. A sketch of this arrangement is shown in figure 2. The values of transmittance listed in Table 1 and plotted in figures 41 through 83 are actually for depths 80 cm lower than indicated. During the lowering of the first cast, readings of sound velocity, temperature, depth and beam transmittance were recorded at selected depths down to a maximum of 100 m. These depths were chosen to provide the highest data density in the areas where the apparent gradients in beam transmittance were





Arrangement of Ramsay Probe and Beam Transmissometer

Figure 2

the largest. These observed values of depth, temperature, sound velocity and beam transmittance are listed by station in Table 1. Due to the fact that the six-conductor, 5/8" diameter cable associated with the beam transmissometer had to be lowered and retrieved by hand, the maximum depth of any data taken was approximately 100 m. Prior to bringing the first cast back to the surface, the output from the beam transmissometer was fed into a strip chart recorder. As the cast was returned to the surface at a constant speed, a continuous record of beam transmittance with time was made. Depth marks were made at approximately ten meter intervals. This record from the strip chart recorder was used in the determination of optimum positions for the Nansen bottles on the second cast. Again, it was attempted to position the bottles to obtain a greater number of samples in the area with the greatest change in transmittance with depth. Samples were taken from the Nansen bottles to determine oxygen content, particulate count, and chlorophyll. The particulate samples were treated with approximately 5 ml of Lugol's iodine solution\* per 250 ml bottle [22,p24]. The particulate samples were analyzed upon completion of the cruise. Due to the short time available for this project it was not possible to analyze the chlorophyll samples.

#### D. DATA REDUCTION PROCEDURE

##### 1. Sound Velocity

It was intended to calculate approximate salinity values at the same depths as the transmittance and temperature data derived from the

---

\*The formula used for Lugol's iodine solution is: 1 g iodine and 3 g potassium iodine per 300 cm<sup>3</sup> distilled water.

first cast at each station. Leroy [16] has formulated equations for determining sound velocity from known values of temperature, salinity, depth and latitude. His equations are based on the data used by Wilson [21] for determining sound velocity. However, Leroy's equations use depth and latitude for the computation of absolute pressure and are much shorter and easier to handle than those of Wilson.

Leroy's basic formula, which covers practically the entire range of variations of salinity, temperature, and depth encountered in ocean waters with very good accuracy is:

$$V = V_o + V_a + V_b$$

$$\text{where: } V_o = 1492.9 + 3(T-10) - 6 \times 10^{-3}(T-10)^2 - 4 \times 10^{-2}(T-18)^2 \\ + 1.2(S-35) - 10^{-2}(T-18)(S-35) + \frac{Z}{61}$$

$$V_a = 10^{-1} \delta^2 + 2 \times 10^{-4} \delta^2 (T-18)^2 + 10^{-1} \delta \frac{\phi}{90}$$

$$V_b = 2 \times 10^{-7} T(T-10)^4$$

$V$  = sound velocity in meters per second

$T$  = temperature in degrees centigrade

$S$  = salinity per mil

$Z$  = depth in meters

$\delta = \frac{Z}{1000}$  , the depth in kilometers

$\phi$  = latitude in degrees

As values of temperature, sound velocity, depth and latitude were available, salinity was to be determined by solving Leroy's sound velocity equation for salinity. The equation used was:

$$\text{Salinity} = \frac{S_a + S_b + S_c}{1.38 - .01T}$$

$$\text{where: } S_a = V - 1492.9 - 3T + 30 + .006(T^2 - 20T + 100) \\ + .04(T^2 - 36T + 324)$$

$$S_b = - \frac{Z}{1000} - .1\left(\frac{Z^2}{10^6}\right) - .002\left(\frac{Z^2}{10^6}\right)(T^2 - 36T + 324)$$

$$S_c = -.0411\left(\frac{Z}{100}\right) - .0000002(T)(T - 10)^4 + 42 - .35T + 630$$

A program was set up to solve this equation using a digital computer. All attempts to use this equation with the cruise data failed in that the resulting salinities were in the range of 30 parts/thousand. Historical data and data taken by Hopkins Marine Station at approximately the same period in Monterey Bay indicate the salinities should be in the range of 33 parts/thousand during the cruise period. These low calculated values of salinity were used in Leroy's original equation for sound velocity and the corresponding value of sound velocity was determined each time it was attempted.

Lovett [18] used Wilson's original sound velocity equation to solve for salinity. He found that the SV/T/P (sound velocity, temperature, pressure) instrument is at least capable of giving the gross features of the salinity profile, even though it did not approach the accuracy possible with an in situ induction salinometer.

LT Garcia of the Naval Postgraduate School has used Leroy's formula to solve for salinity. He has concluded that, although his salinity values do not appear to be extremely accurate, they at least yield a rough profile of salinity.

SV/T/D temperatures obtained during the cruise were found to agree with the XBT temperatures taken (Appendix). During the cruise the SV/T/D probe depths were found to agree with meter wheel depths.

As sound velocity is by far the dominating factor in the given salinity equation, it is concluded that the values of sound velocity are in error. Therefore, the values of sound velocity are given in Table 1 as relative values only and salinity was not considered in this investigation. It is believed that the values of sound velocity are consistently low by approximately 3 m/sec.

## 2. Oxygen

The Winkler method, as described by Carritt and Carpenter [6], was used to determine the oxygen content at selected depths. All the samples were "pickled" immediately after being removed from the Nansen bottles and titrated within four hours during the cruise. Upon completion of the cruise, the dissolved oxygen in each sample (ml/l) was determined by the following formula:

$$DO_s = \frac{(R_s - R_b) 559.8}{(R_{st} - R_b)(V_b - 2)} - .02$$

where:  $DO_s$  = dissolved oxygen in sample (ml/l)

$R_s$  = burette reading for sample (ml/l)

$R_b$  = value of reagent blank (ml)

$R_{st}$  = burette reading for standard (ml)

$V_b$  = volume of sample bottle (ml)

A PDP-8/S digital computer was used to solve this equation for each sample. The use of this computer was found to be a very quick and efficient method for determining the dissolved oxygen content for a large number of samples.

Oxygen data are given in Table 2.



### 3. Particulate Count

The particulate count of each sample was determined using a Model A Coulter Counter. Every sample was run at least twice at the zero threshold setting. If these values were not well within 10% of each other, then a third run was made and the middle value of the three recorded. The samples were repeatedly stirred by hand with a glass rod to insure against any settling of the particles to the bottom. As it was anticipated that the majority of particles would be found in the 0 - 10  $\mu$  range, a threshold setting of 5 was also used. The particulate data are listed in Table 2. In order to conserve time in the tedious process of using the Coulter Counter, not all runs were carried out completely to the 100 threshold setting. A run was terminated when the difference between any two successive threshold settings was 10 counts or less.

### III. ANALYSIS OF DATA

#### A. INTRODUCTION

The data was looked at in several ways in order to determine the possible relationships between oxygen, temperature, particulate content and beam transmittance.

The values of temperature, oxygen, particulate count and beam transmittance were plotted against depth for each station. A computer program used by Yeske and Waer [22,p111] was modified somewhat to plot the station profiles (figures 41 - 83).

Vertical contours of beam transmittance and particulate count, beam transmittance and temperature, and beam transmittance and oxygen content were constructed for the following seven lines of stations: A1 to A12, B1 to B12, E1 to E7, G7 to F3, I1 to I9, K9 to J4, M2 to M6. These contours are presented in figures 4 through 24.

The depth, time, latitude and longitude, weather data, and values of sound velocity, temperature, and beam transmittance at the sampled depths for each station are listed in Table 1.

Table 2 contains the particulate count at each threshold setting of the Coulter Counter and also the oxygen content for the sampled depths. These are listed by stations in table format.

Horizontal contours of beam transmittance, particulate count, oxygen, and temperature were drawn for depths of zero meters, twenty meters, forty meters, and sixty-one meters. These contours are figures 25 through 40.



## B. TABLE OF SOUND VELOCITY, TEMPERATURE, AND BEAM TRANSMITTANCE

From this data the average sea surface temperature for the 86 stations was determined to be  $14.44^{\circ}\text{C}$ . This value is in agreement with Bolin [5,pv] who has described the Oceanic Period as the warmest of the year with surface temperatures averaging more than  $13^{\circ}\text{C}$ .

The coldest sea surface temperature was  $13.40^{\circ}\text{C}$  at station A1 in Monterey Bay. Six of the stations in Monterey Bay, A7 through A12, had sea surface temperatures less than  $14^{\circ}\text{C}$ . With the exception of stations B1, B2, and J1, all other stations had sea surface temperatures greater than  $14^{\circ}\text{C}$ .

The average beam transmittance value at the surface for the 86 stations is 70%.

## C. PROFILES OF PARTICULATE COUNT, OXYGEN CONTENT, TEMPERATURE AND TRANSMITTANCE

At stations where a strong thermocline could be detected, there was usually found a maximum particulate count within this thermocline. No specific location of this maximum within the thermocline was evident, as the maximum was found as often in the top portion of the thermocline as it was in the middle and bottom portions of the thermocline.

Twenty-three stations showed a definite decrease in oxygen content with a maximum particulate count (A4, A6, A7, A8, A9, B4, B7, B8, B10, B11, C2, E1, E6, G3, I2, I3, I7, I8, K8, K9, K10, L2, M4). This comparison was made at depths at least 20 meters from the bottom. In the vicinity of the bottom it was expected that the particulate count would be high and the oxygen content low.

The decrease in oxygen associated with the maximum particulate count may possibly indicate the consumption of oxygen by seston.

The stations taken during hours of darkness were examined to see if there was any trend for the layer of maximum particulate count to be closer to the surface during this time. No such trend was evident, however.

The two stations in the northernmost part of Monterey Bay, A12 and B1, had by far the highest particulate count and lowest transmittance values of any of the 86 stations. This is discussed below on page 26.

#### D. VERTICAL CONTOURS OF BEAM TRANSMITTANCE, PARTICULATE COUNT, TEMPERATURE AND OXYGEN

The following relative terms are used to define the various water masses:

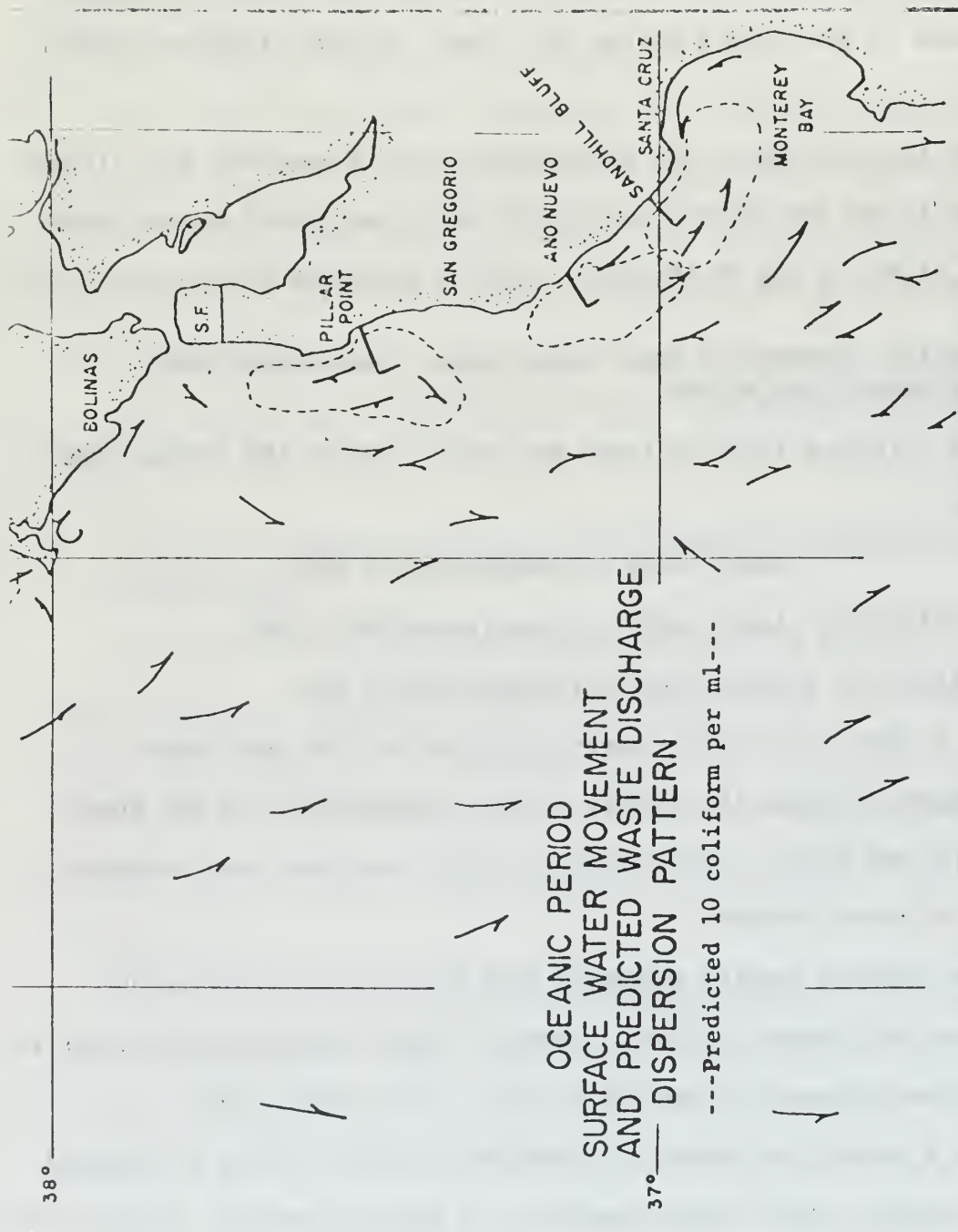
"clear" water = transmittance  $> 70\%$

"relatively clear" water = transmittance  $50\% - 60\%$

"relatively turbid" water = transmittance  $< 50\%$

Figure 3 shows one possible current pattern for the area under investigation during the Oceanic Period, suggested by the Bay Study Group [7] and based on some studies of this area made over a number of years by various workers.

The vertical profile extending from stations A1 to A12 across Monterey Bay (figure 4) shows an area of "clear" water which extends to the surface between stations A9 and A10. This water spreads and reaches a depth of 60 meters at stations A2 and A8. This is bordered by "relatively clear" water from A2 to A8 above 60 meters. Another area of interest in figure 4 is the 60 to 90 meter depth between stations A5 and A6 over Monterey Canyon. Here the water changes from "clear" to



[From Bay Delta Study 1968]

Figure 3

"relatively turbid", and the particulate count increases. Also station A12 is shown to have "relatively turbid" water and high particulate count. Figure 5 shows a band of water with temperatures between  $13.4^{\circ}$  and  $13.8^{\circ}\text{C}$  coming in at the surface between stations A10 and A11, which sinks and follows approximately the same pattern as the "clear" water above 60 meters. Between 60 and 90 meters figure 5 shows the temperatures in this area to be closely related to those at the same depth along the sides of the Canyon. Figure 6 shows an area of oxygen content between 5.4 ml/l and 5.2 ml/l closely following the area of "clear" water above 60 meters. Figure 7 shows an area of "clear" water and low particulate count between stations B4 and B9 which extends from the surface down to approximately 60 meters. Again in the area between 60 to 90 meters the water becomes "relatively turbid" and the particulate count increases. The water in the vicinity of station B12 has a high particulate count and "relatively turbid" water. The temperatures in the 60 to 90 meter region (figure 8) again appear to be closely related to those at the same depth along the sides of the Canyon. Figure 9 shows the oxygen content in the water between 60 to 90 meters over the Canyon to be relatively low. In May 1969 the water around B1 and A12 was also "relatively turbid" with a high particulate count [14,p91], and the water over the Canyon between 60 and 90 meters was relatively turbid. However, in May the isotherms seemed to extend horizontally directly across the Bay [14,p92].

Even though the California Current coming down the coast at this time of year is classified as a cold current, it is relatively warm when compared with the coastal waters in the Monterey Bay area [19,p131]. Keeping this and the current structure shown in figure 3 in mind, it is



suggested that the California Current is entering Monterey Bay during this period and is centered roughly in the middle of the Bay.

The area of "relatively turbid" water in the Canyon between 60 and 90 meters appears to be the result of bottom currents running along the Canyon shelves. Gatze and Pizinger, in their study of bottom currents at the head of Monterey Canyon, found currents as great as 4 knots [9,p39], in the Canyon and pointed out that if currents of similar strength exist on the surrounding shelves and slopes, there may be considerable transport of sediment into the Canyon from a large area.

From figure 3, one might expect the longshore current in Monterey Bay to be primarily northward with a closed eddy system from the northern side of Monterey Bay up the coast to Ano Nuevo. This eddy system - if it in fact exists - seems to circulate water nearshore in a counter-clockwise direction along the northern side of Monterey Bay up to Ano Nuevo, where it turns south and comes back to Monterey Bay and turns north again near Moss Landing [7,pVI-8]. "Turbid" water is not present to the north of Santa Cruz at station F7. The "turbid" water at stations A12 and B1 may be attributed to littoral material with some sewage outflow and coastal runoff being carried into the eddy system and remaining entrapped in its closed circulation. It should also be noted that these are very shallow stations, having depths of 17 meters and 16 meters respectively, and tidal action may also be contributing to this "turbid" water.

Figure 10 shows an area of "clear" water and low particulate count from the surface down to 100 meters between stations E1 and E2. This area also has higher temperatures than the water nearer the coast (figure 11). An area of this nature with "clear" water, low particulate

count, and higher temperatures was not noticed during May 1969 [14,p97]. Again this appears to be the area of the eastward edge of the southward flowing California Current.

Figures 10 through 15 show the first three or four stations nearest the coast to have "relatively turbid" water, high particulate count, high temperatures and high oxygen content between 20 and 40 meters. According to Bolin [5,pv], the Davidson Current starts flowing northward along the coast in November. Due to the coriolis force, the surface water of this current runs up to the shore and sinks. From these contours it appears that there is downwelling taking place just south of Pt. Ano Nuevo and just north of Santa Cruz. This was not in evidence during May 1969, when upwelling was actually occurring [14,p44].

The temperature contours between stations G1 and G3 (figure 14), however, show the characteristics of a possible "cold spot". "Cold spots" are dome-like in their three-dimensional structure and may possibly be formed (primarily by tidal action) over an irregular bottom [15,p238]. They normally have a diameter not greater than about three miles, with the broadest extent of mixed water and the lowest temperatures in the deepest levels [15,p238]. A "cold spot" was also possibly in evidence at stations J4 and J5 off Pt. Ano Nuevo during May 1969 [14,p102].

Figures 16 and 17 show a band of "clear" water, low particulate count and relatively high temperatures between stations I3 and I8. Figure I8 shows the oxygen content to be increasing from the coast seaward to station I3. Again this appears to be the eastward edge of the southward flowing California Current. During May 1969 this area

had relatively high values of particulate count and the isotherms were fairly horizontal from the coast seaward [14,p104].

A band of "clear" water and low particulate count is present from the surface to approximately 60 meters between stations K5 and K9 (figure 19). Figure 20 shows the isotherms moving up towards the surface from station K7 seaward. The highest oxygen content in this area is between the surface and 20 meters seaward from station K7 (figure 21).

In May 1969, this area also had "clear" water and low particulate count, but the isotherms appeared to be bending down going seaward [14,p108], i.e. some upwelling was apparently there.

Figure 22 shows "relatively clear" water and low particulate count across the approach to San Francisco Bay. The isotherms (figure 23) and the isolines of oxygen (figure 24) are approximately parallel across this area. It appears that the California Current might possibly be entering this region at the approach to San Francisco Bay during this period of the year. In May 1969 the water above 20 meters in this area was "relatively turbid" with high values of particulate count [14,p112].

#### E. HORIZONTAL CONTOURS OF BEAM TRANSMITTANCE, PARTICULATE COUNT, TEMPERATURE AND OXYGEN

Figures 25 through 28 show the beam transmittance values to be increasing seaward at depths of 0, 20, 40, and 61 meters. This trend was also evident in May 1969, but the overall values of beam transmittance were lower than at these depths [14,p86]. In May 1969 there was a localized area of very "turbid" water at the surface off Pt. Montara with beam transmittance less than 10%/m. This "turbid" water extended



seaward approximately 25 nmi [14,p77]. During November 1969, this surface water was "relatively clear" with beam transmittance ranging from 60 to 80%/m (figure 25).

The temperatures increase seaward (figures 33,34,35) at 0, 20, and 40 meters but at 61 meters (figure 36) the trend is reversed. At 61 meters the temperature between A1 and A6 in Monterey Bay is higher than any other location. Figure 40 shows the oxygen content between stations A1 and A8 at 61 meters to be the highest in the entire region studied. It appears that the southward flowing California Current does not reach a depth of 61 meters along the coast but does sink down to at least 61 meters in Monterey Bay.

At 20 meters (figure 30) the particulate count is relatively high along the coast as compared to the particulate count at the surface (figure 29) from Santa Cruz to Pt. Montara. At 40 meters (figure 31) this area of high particulate count appears to have moved seaward. The oxygen content in this same area at 40 meters (figure 39) is also relatively high. Again, this may be attributed to downwelling along the coast, where the downwelled water having a high oxygen content is traveling down the shelf and carrying with it the disturbed bottom sediment.

#### F. COMPARISON OF BEAM TRANSMITTANCE AND PARTICULATE COUNT

Except for layers of relatively turbid water, the general trend for particulates was to decrease in total count with depth. An exception to this is noted for the waters along the coast and those near the bottom, which showed relatively high particulate counts.

Fifty-nine stations showed a good relationship between particulate count and transmittance, and nineteen stations showed a fair relationship. As particulate count increased the beam transmittance decreased.

#### G. COMPARISON OF BEAM TRANSMITTANCE AND TEMPERATURE

Where a strong thermocline was present, a layer of turbid water was usually located within the thermocline. Other than this, no correlation was noted between transmittance and temperature.

#### H. COMPARISON OF BEAM TRANSMITTANCE AND OXYGEN CONTENT

Twenty-three stations showed a definite decrease in oxygen content associated with a low value of beam transmittance and a high value for particulate count. It is not evident from this information alone that any correlation exists between transmittance and oxygen content.

#### I. COMPARISON OF PARTICULATE SIZE WITH DEPTH

At each station across Monterey Bay (A1-A12) the percentage of the total particulate count between the 0 and 10 threshold setting was greater at the deepest depth sampled than at the surface. Of the 12 stations sampled, 66% of the particulate count on the surface was between the 0 and 10 threshold setting and 75% of the particulates at the deepest depth sampled were between the 0 and 10 threshold setting. Therefore, the surface waters appear to contain coarser sediment than waters at depth for each of the stations sampled inside Monterey Bay.

There was a general trend for the total particulate count to decrease seaward and to decrease with depth except near the coast and near the bottom, where there was an increase in total particulate count.

A fairly good correlation seems to exist between total particulate count and percent transmittance, with the transmittance decreasing as the particulate count increases.

#### IV. CONCLUSIONS

The average sea surface temperature in the coastal waters between San Francisco Bay and Monterey Bay during the period 7-14 November 1969 was  $14.44^{\circ}\text{C}$ , approximately  $2^{\circ}\text{C}$  higher than that for 10-18 May 1969.

The northern part of Monterey Bay has relatively turbid water, which may be attributed to the northward littoral current and a closed eddy circulation system between the northern portion of Monterey Bay and Pt. Ano Nuevo.

The middle of Monterey Bay is characterized by "clear" water with relatively high temperature down to a depth of approximately 60 meters. This appears to be the area where the California Current is entering Monterey Bay. Stations in lines perpendicular to the coast off Santa Cruz, off Pt. Ano Nuevo, off Pigeon Point, and off Pt. Montara also show this area of clear water and indicate the southward flow of the California Current. This current appears to be above 60 meters along the coast but sinks down to approximately 60 meters in Monterey Bay.

At a depth of 60 to 90 meters over the Monterey Canyon there is a patch of "relatively turbid" water with temperatures closely related to those near the canyon walls on either side. This "relatively turbid" water appears to be the result of currents running down along the sides of the Canyon.

The area just off the coast south of Pt. Ano Nuevo and just north of Santa Cruz has a layer of "relatively turbid" water, high temperatures, and high oxygen content between approximately 20 and 40 meters. It is suggested that the northward flowing Davidson Current has commenced and is impinging on the coast in these areas, and downwelling is taking place.

No indication of upwelling was present at this time.

At all of the stations along lines perpendicular to the coast there was an increase in beam transmittance with corresponding decrease in particulate matter in a direction seaward from the coast.

A fairly good correlation seems to exist between transmittance and particulate count.

A layer of maximum particulate count was often found to exist within the thermocline. Other than this, there was no obvious correlation between temperature and beam transmittance.

No simple relationship between beam transmittance and oxygen content was apparent.

The surface waters contain coarser sediment than the waters at depth at all 12 stations sampled across Monterey Bay.

Approximately 74 percent of all particulates observed appeared to be less than  $6.2 \mu$  in diameter.



## V. SUGGESTIONS FOR FUTURE RESEARCH

This investigation should be continued to cover the Davidson Current period; that is, during the period from November to January approximately.

Values of salinity (and density) would have been extremely useful in analyzing this data. If such a study is continued it is recommended that an STD be used or that salinity samples be taken.

It would be of interest to run the particulate samples again to see what aging effects, if any, are present in the samples preserved with Lugol's solution.

A thorough investigation of the "relatively turbid" water in the northern part of Monterey Bay should be undertaken. In addition to the parameters used in this study, measurements of phosphate and nitrogen should be made, and biological samples should be taken to determine the actual source of the high particulate count found in that area.

Further studies should be made of the bottom currents along the Canyon shelf area.

Lastly, the chlorophyll samples taken during this cruise should be analyzed and the results compared with results found in this study.

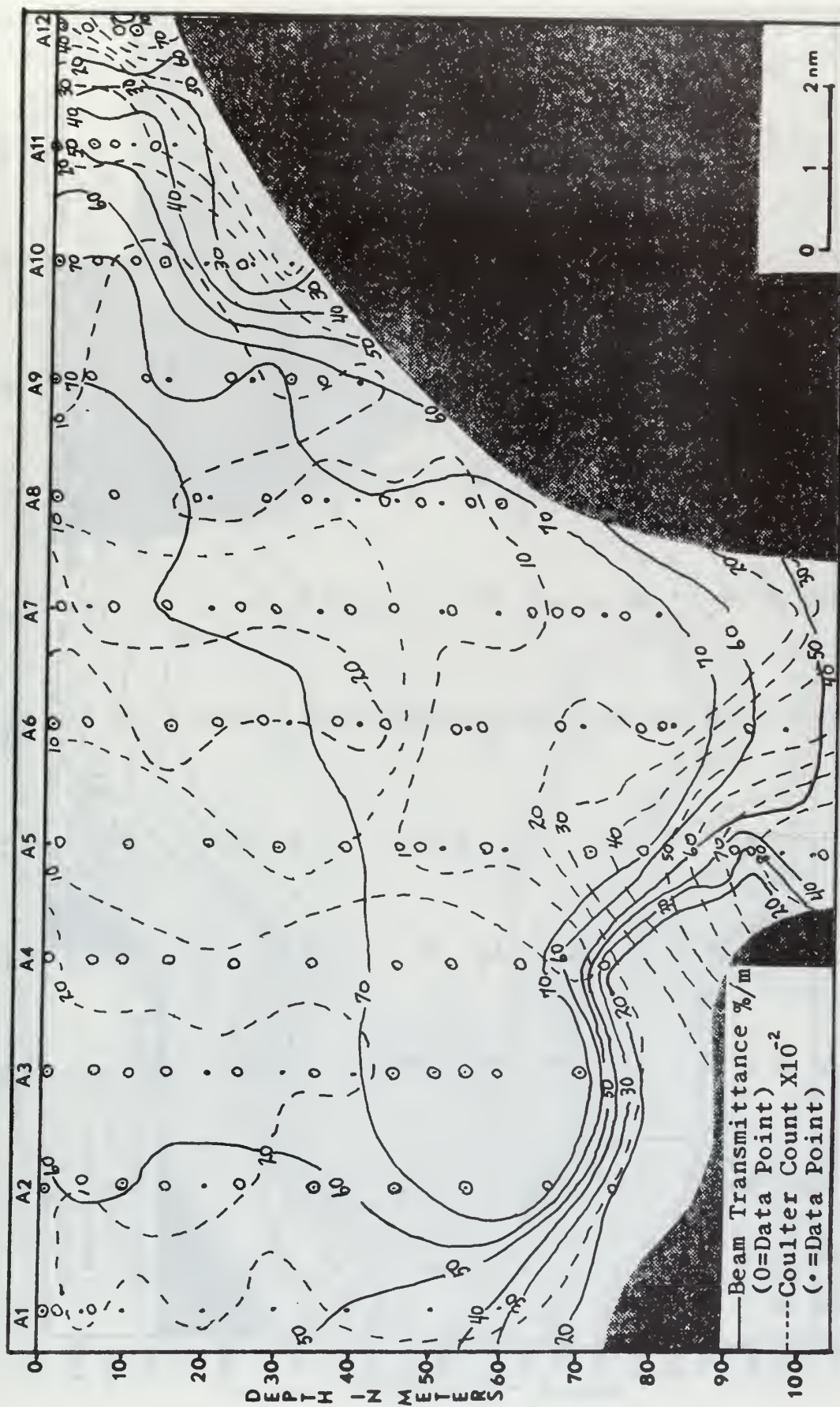


FIGURE 4

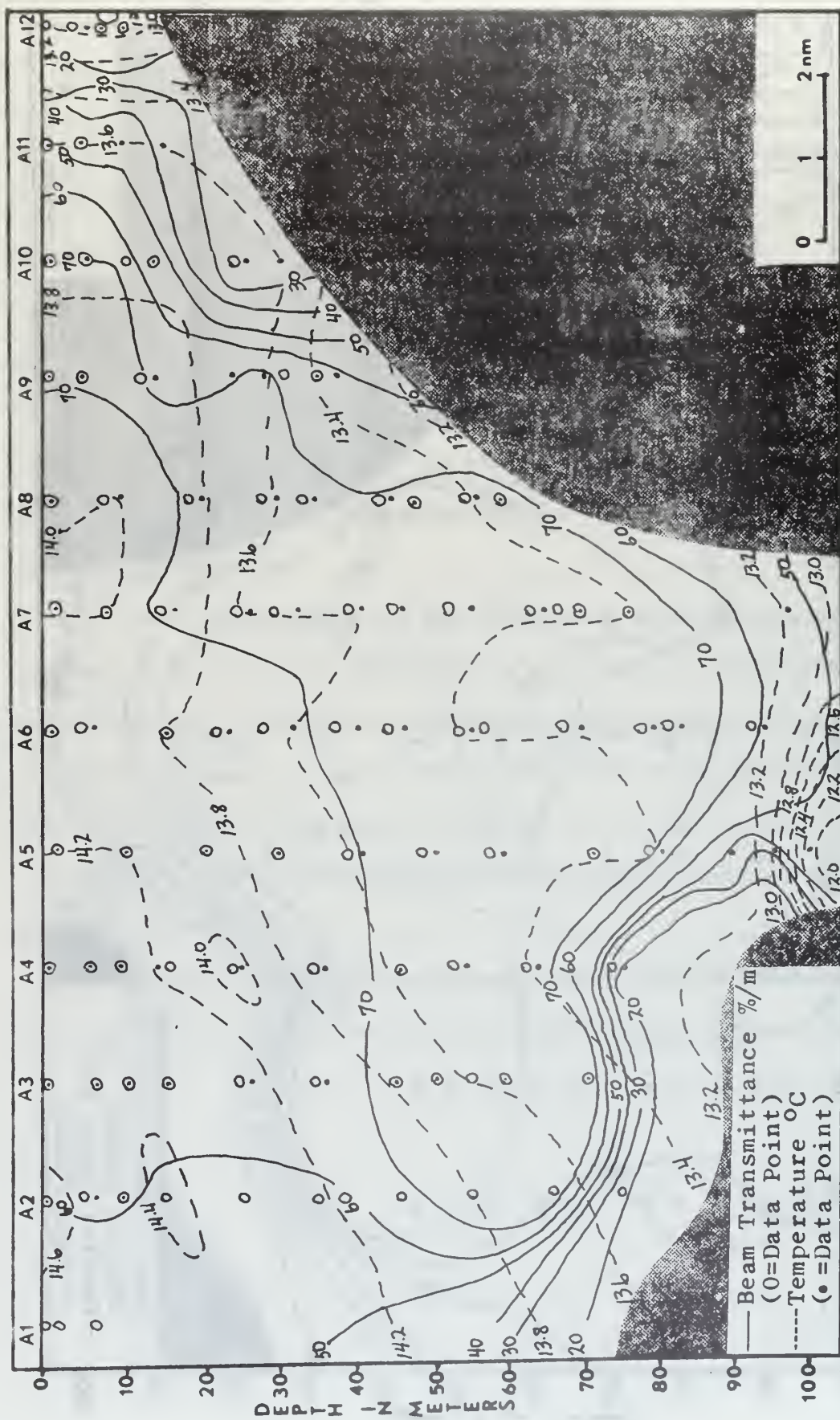


FIGURE 5



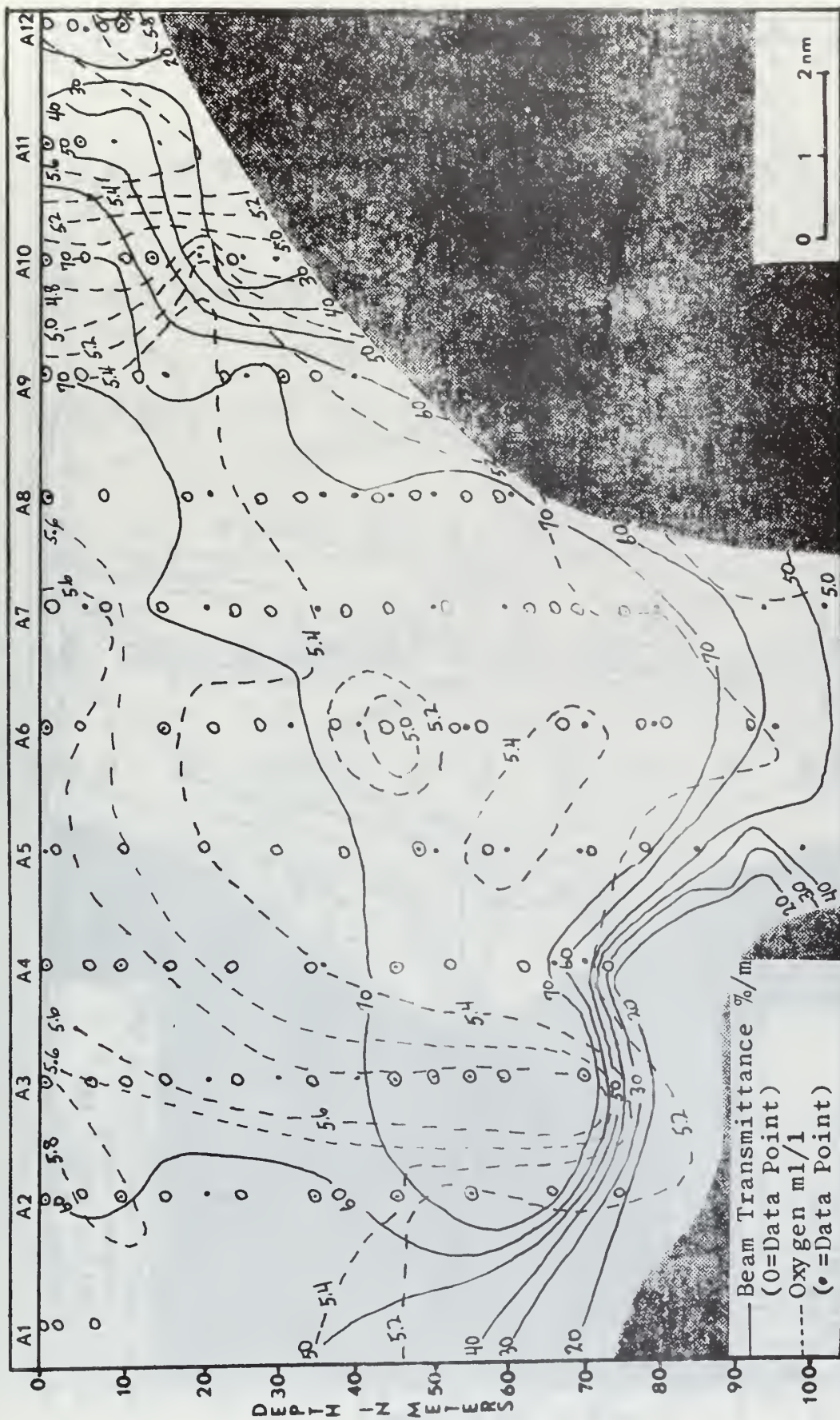


FIGURE 6

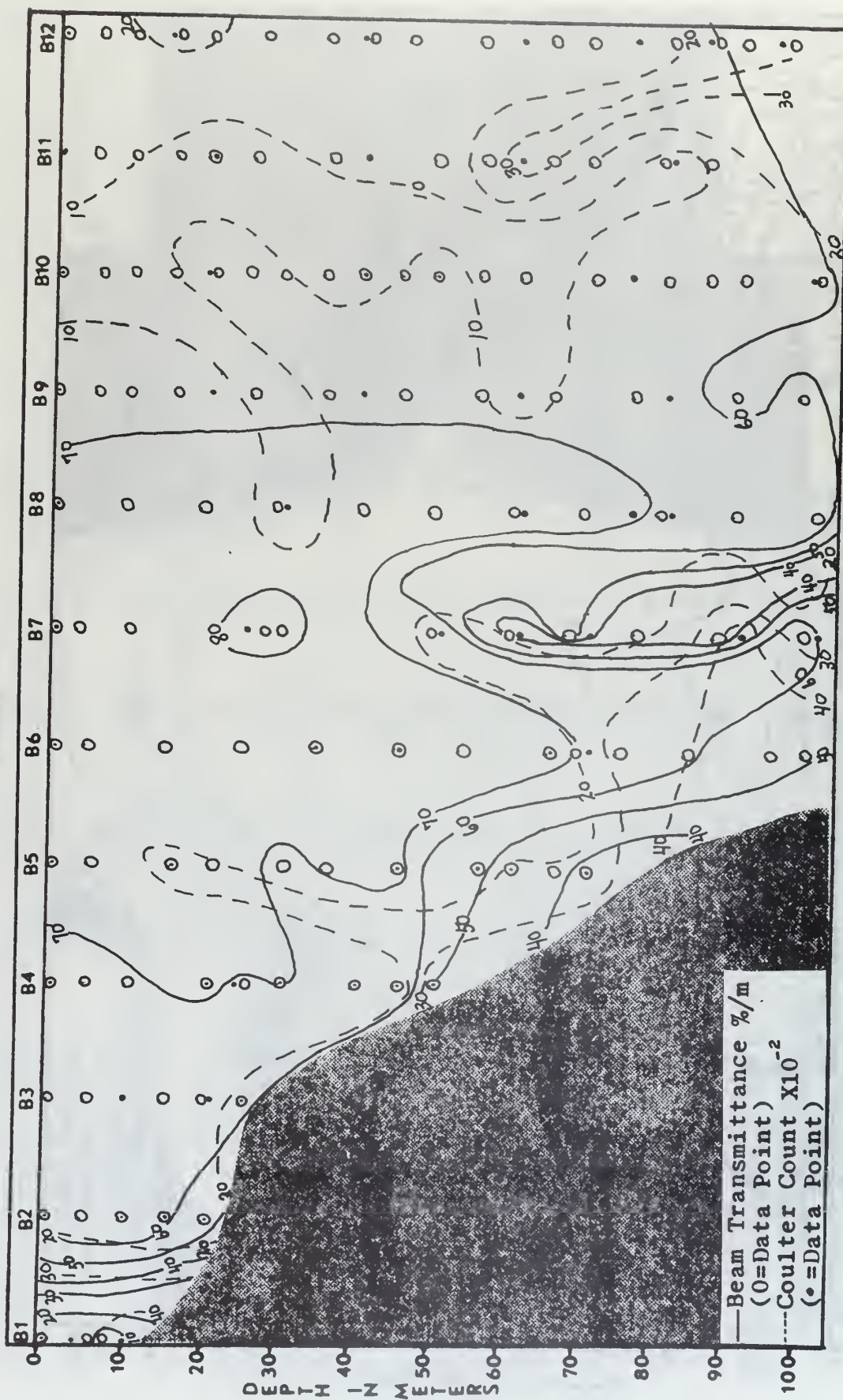


FIGURE 7



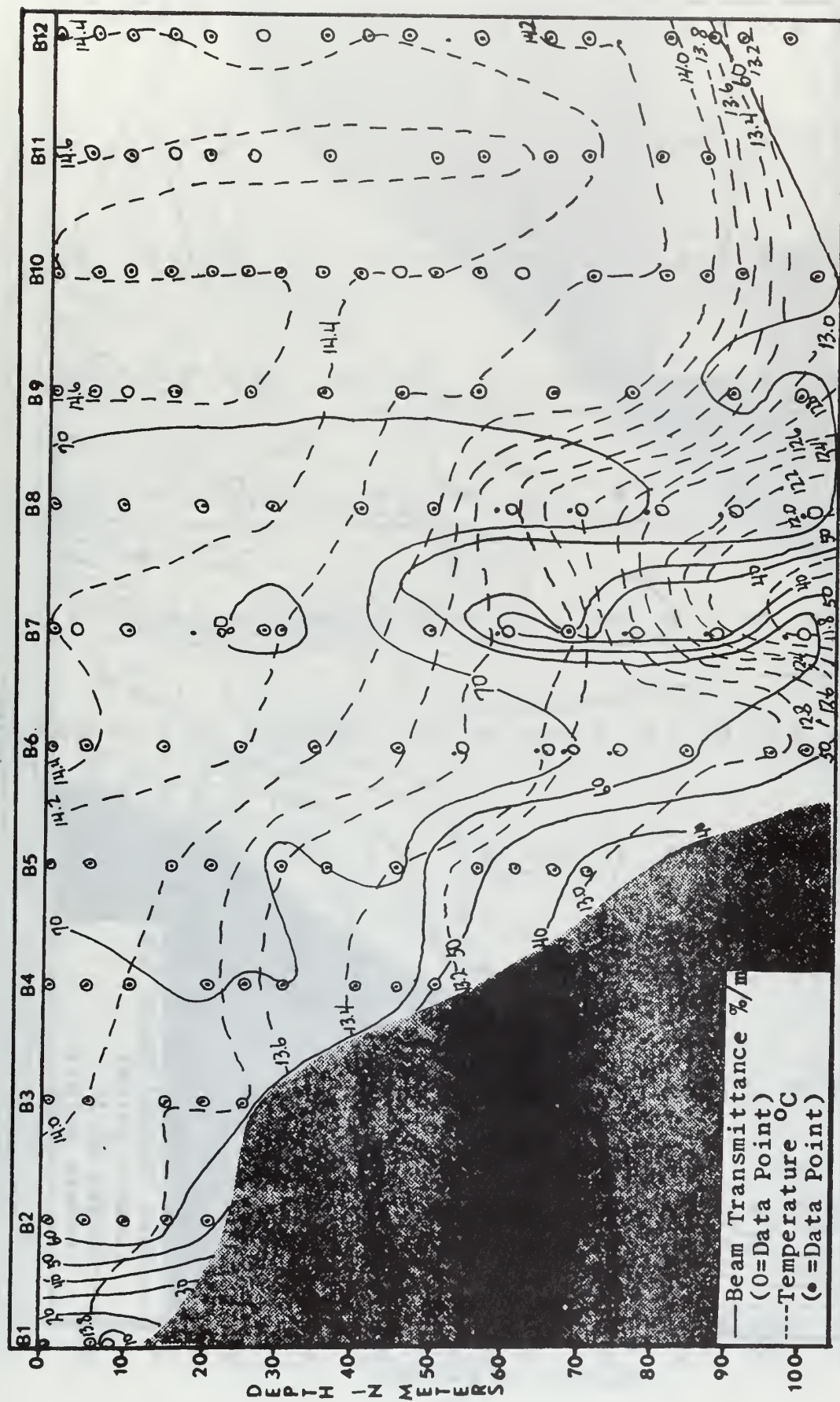


FIGURE 8

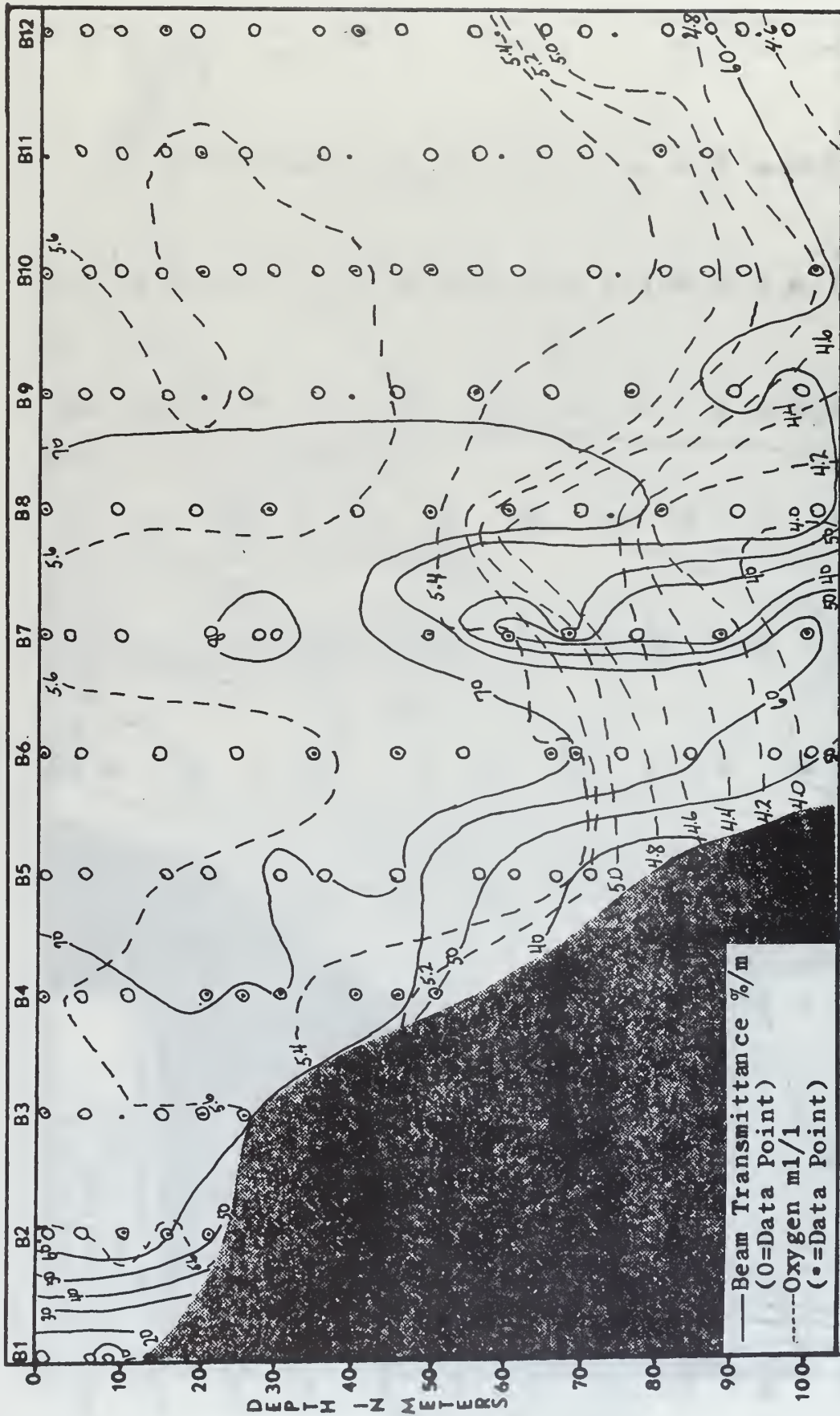


FIGURE 9

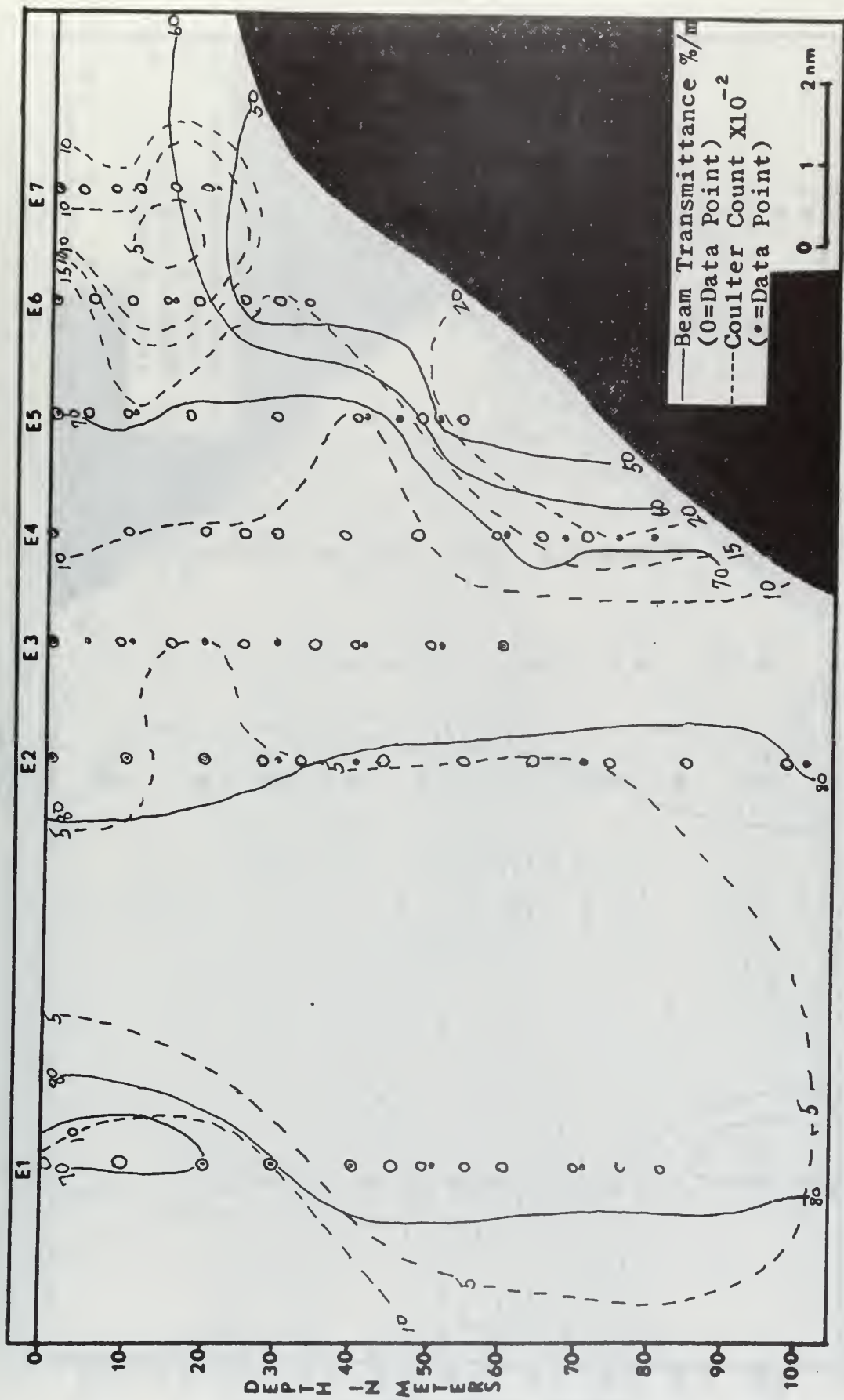


FIGURE 10



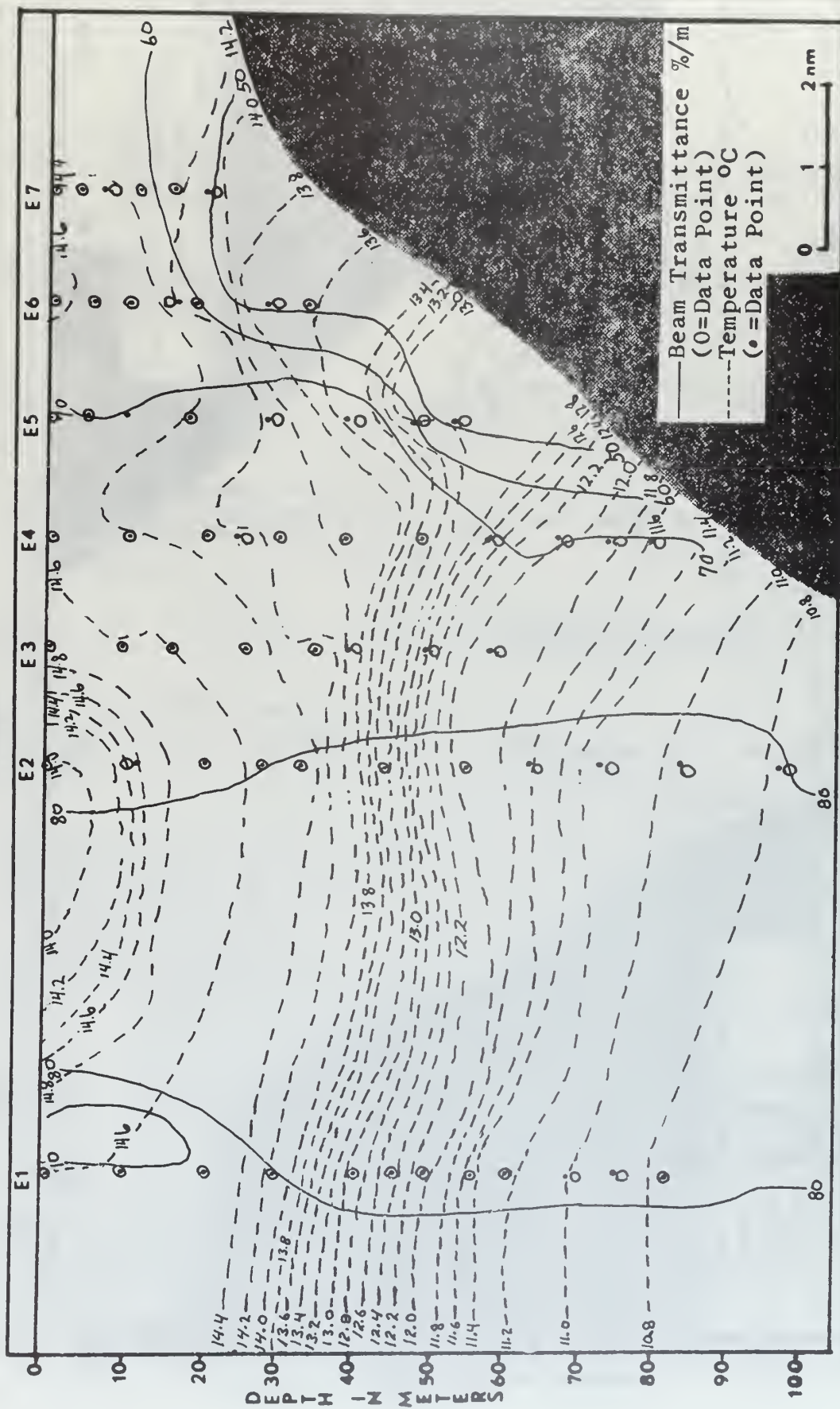


FIGURE 11

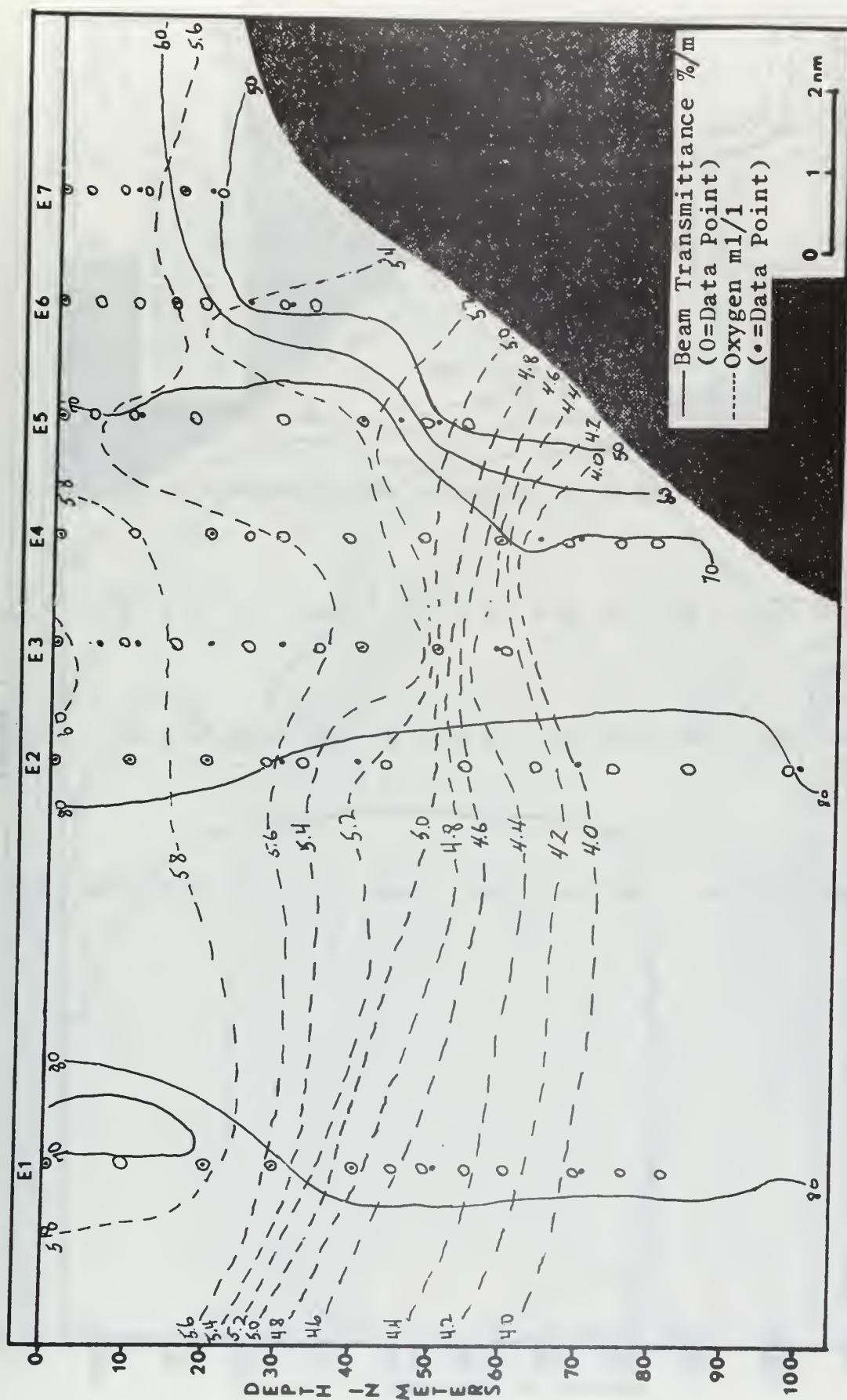


FIGURE 12



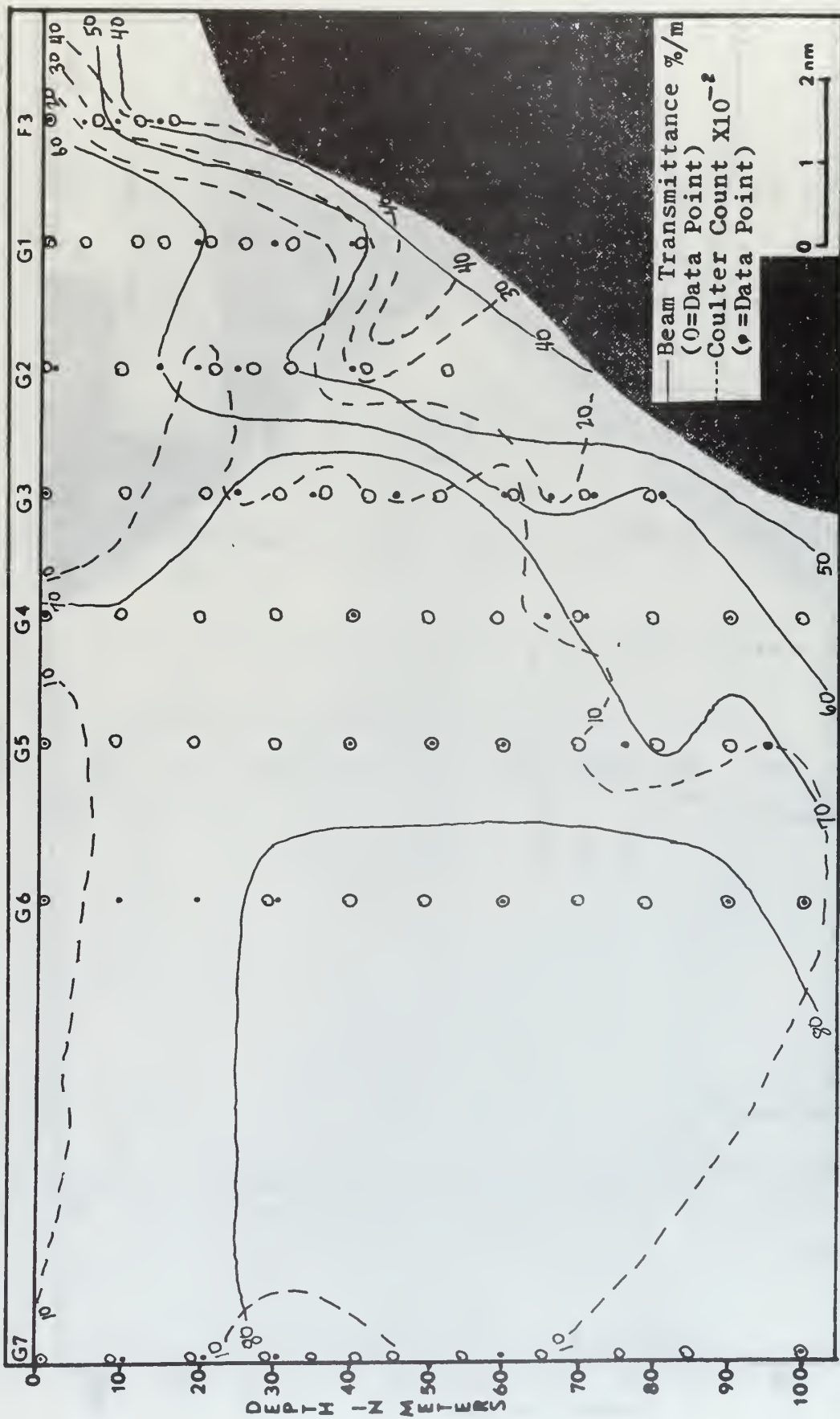


FIGURE 13

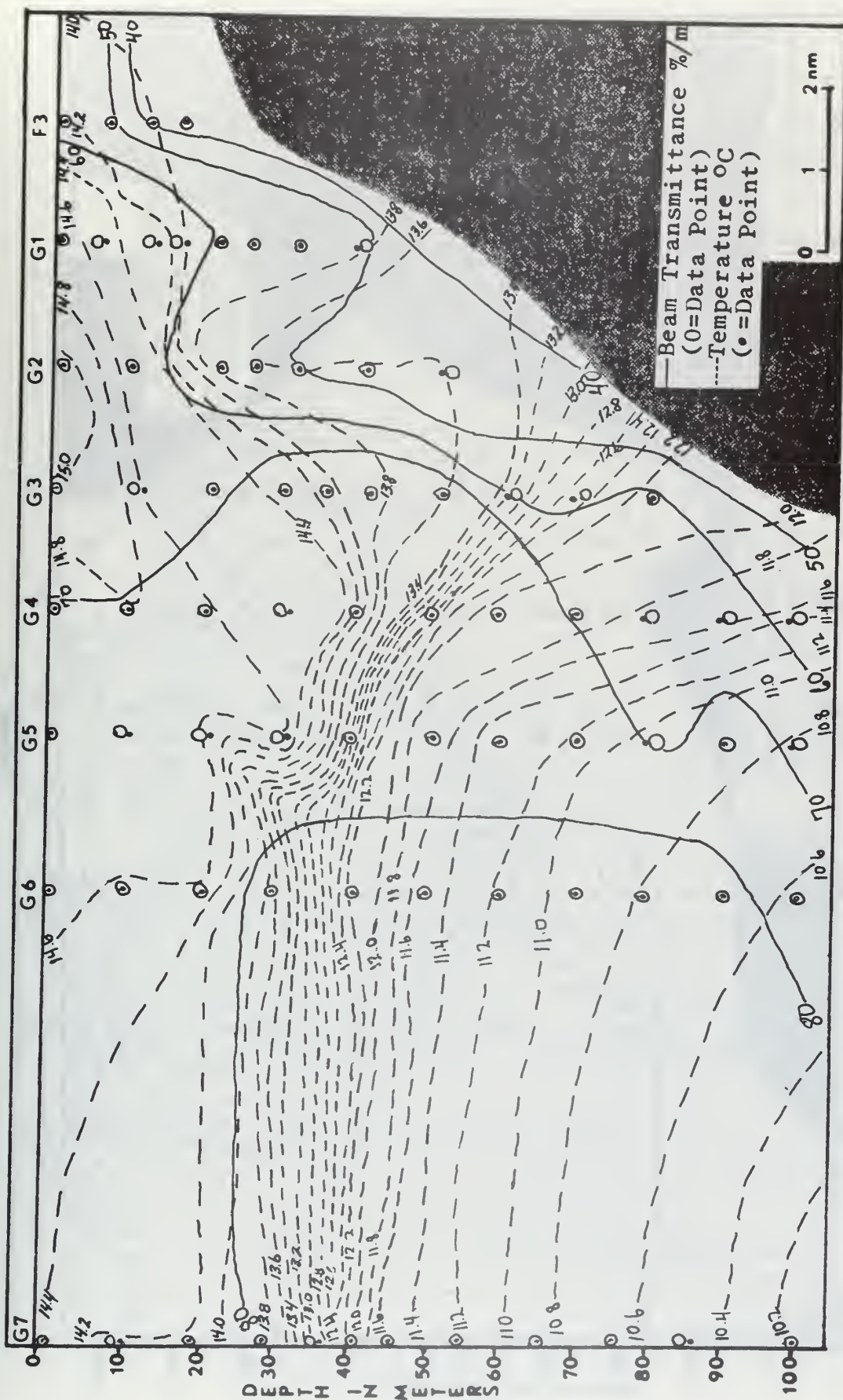


FIGURE 14

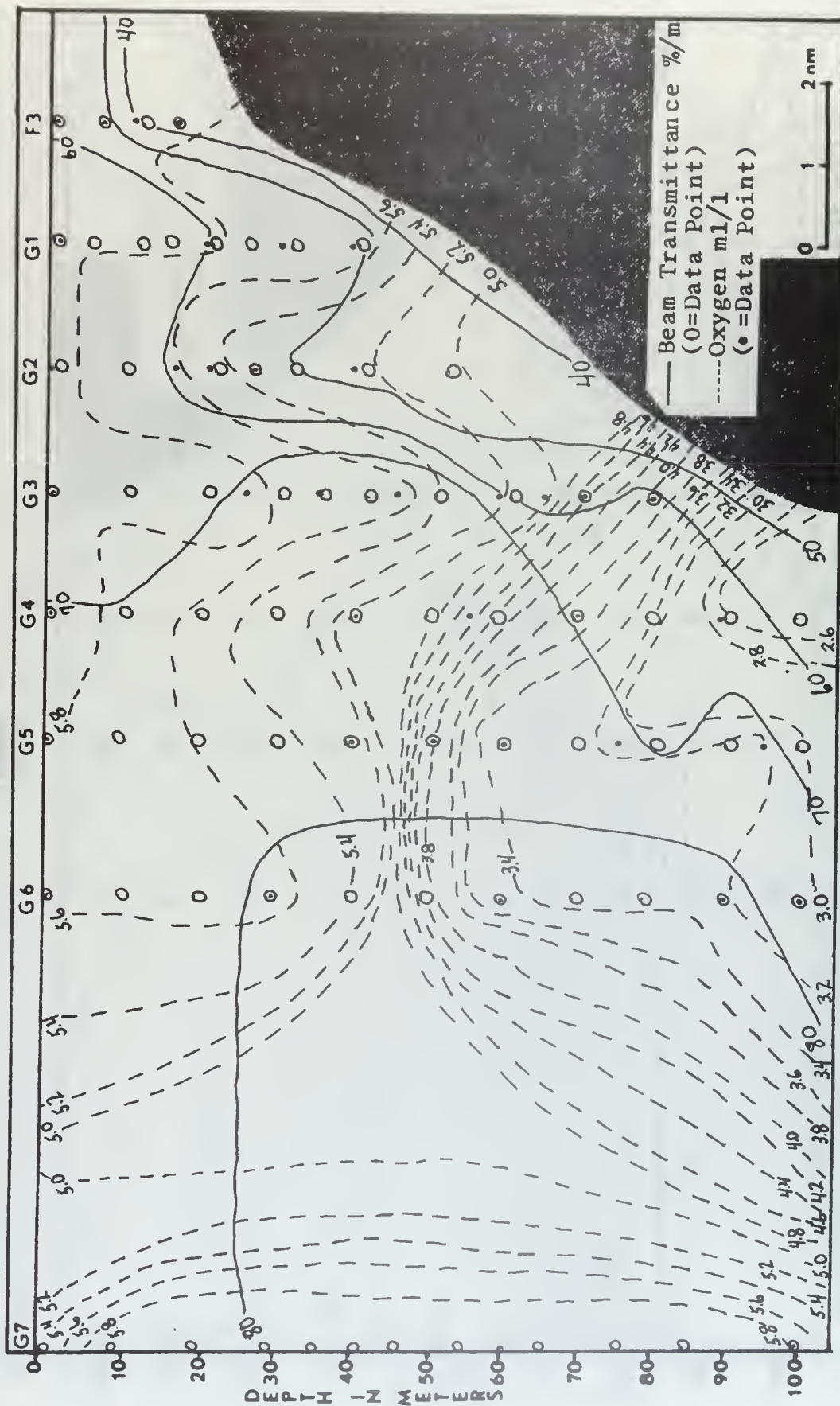


FIGURE 15



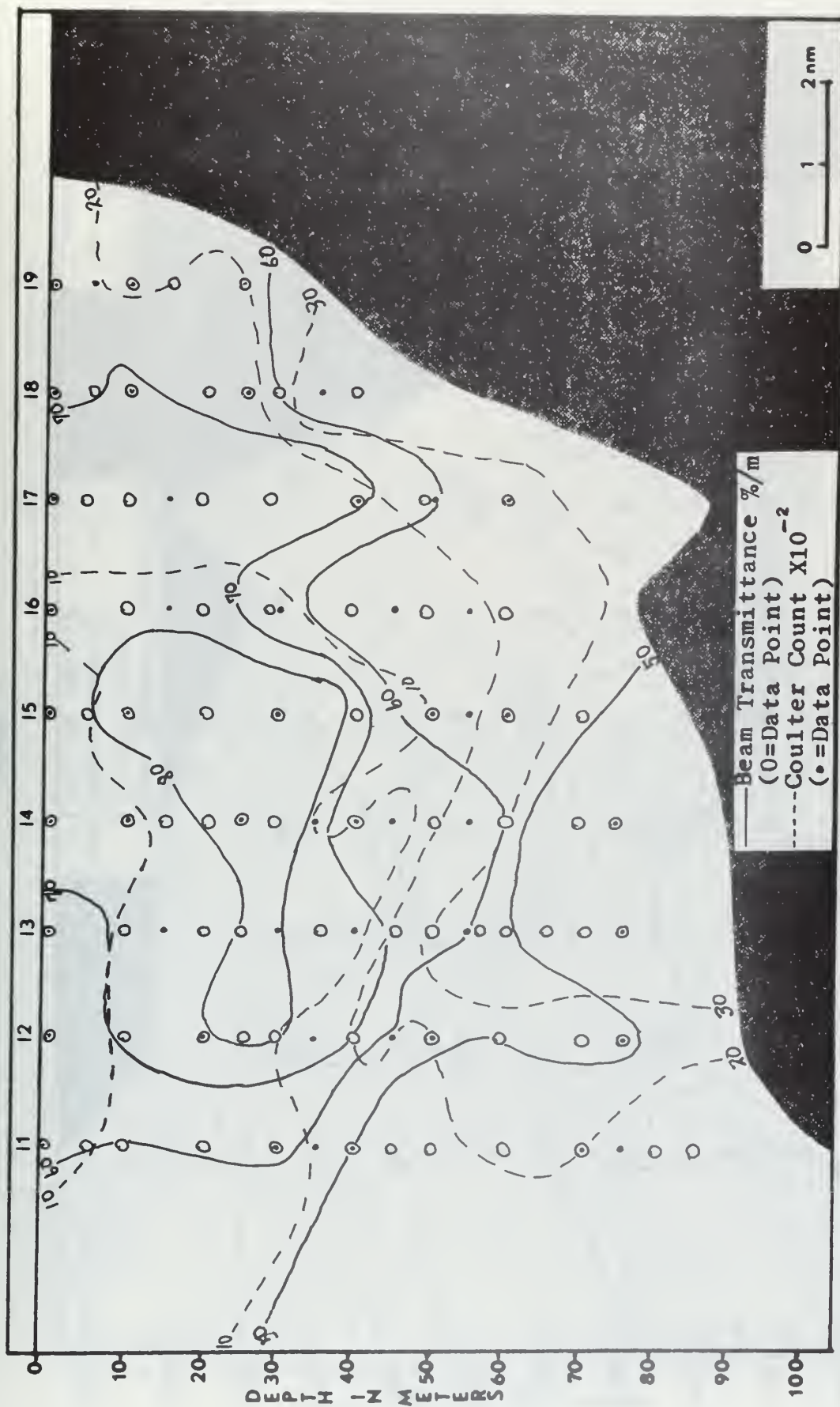


FIGURE 16

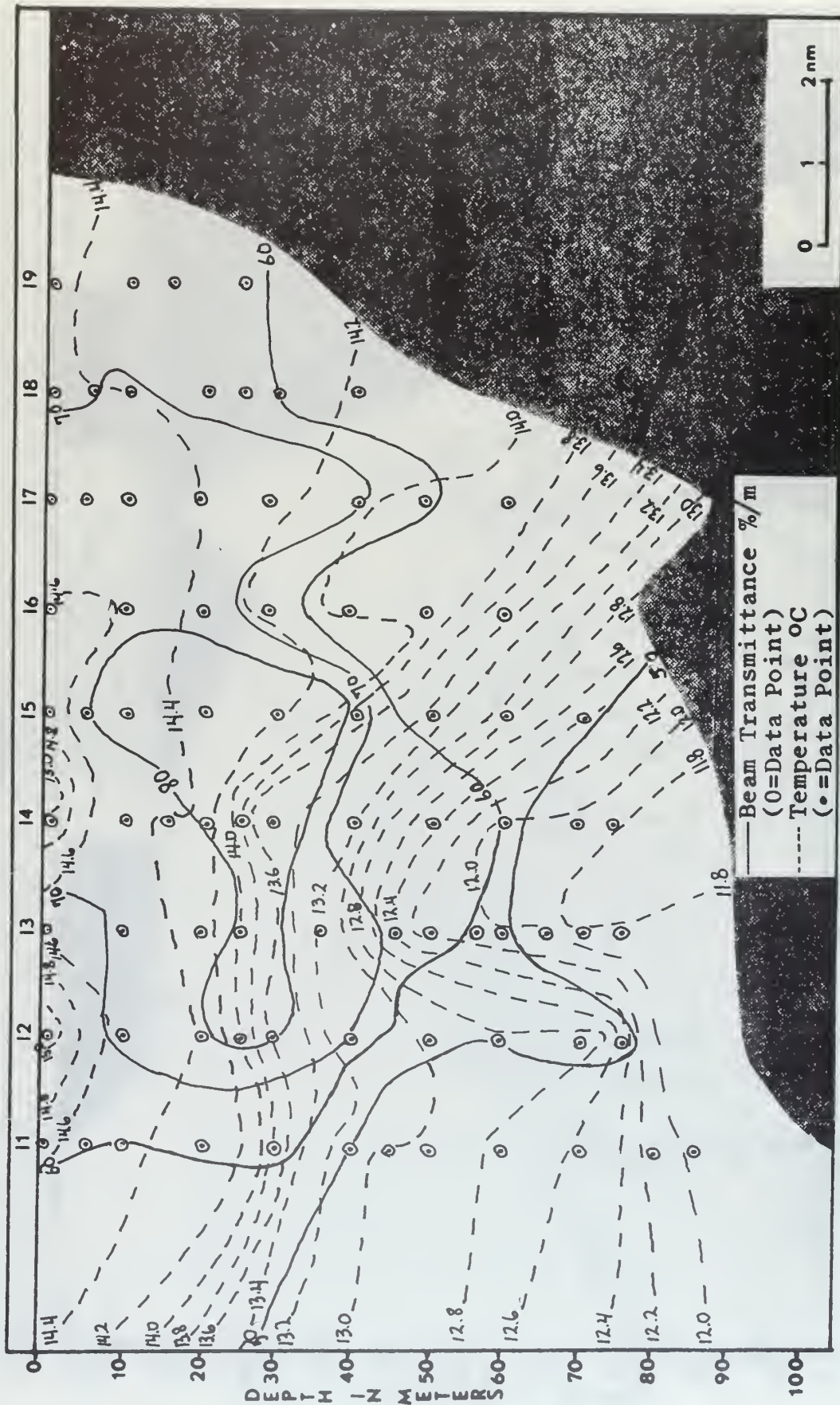


FIGURE 17



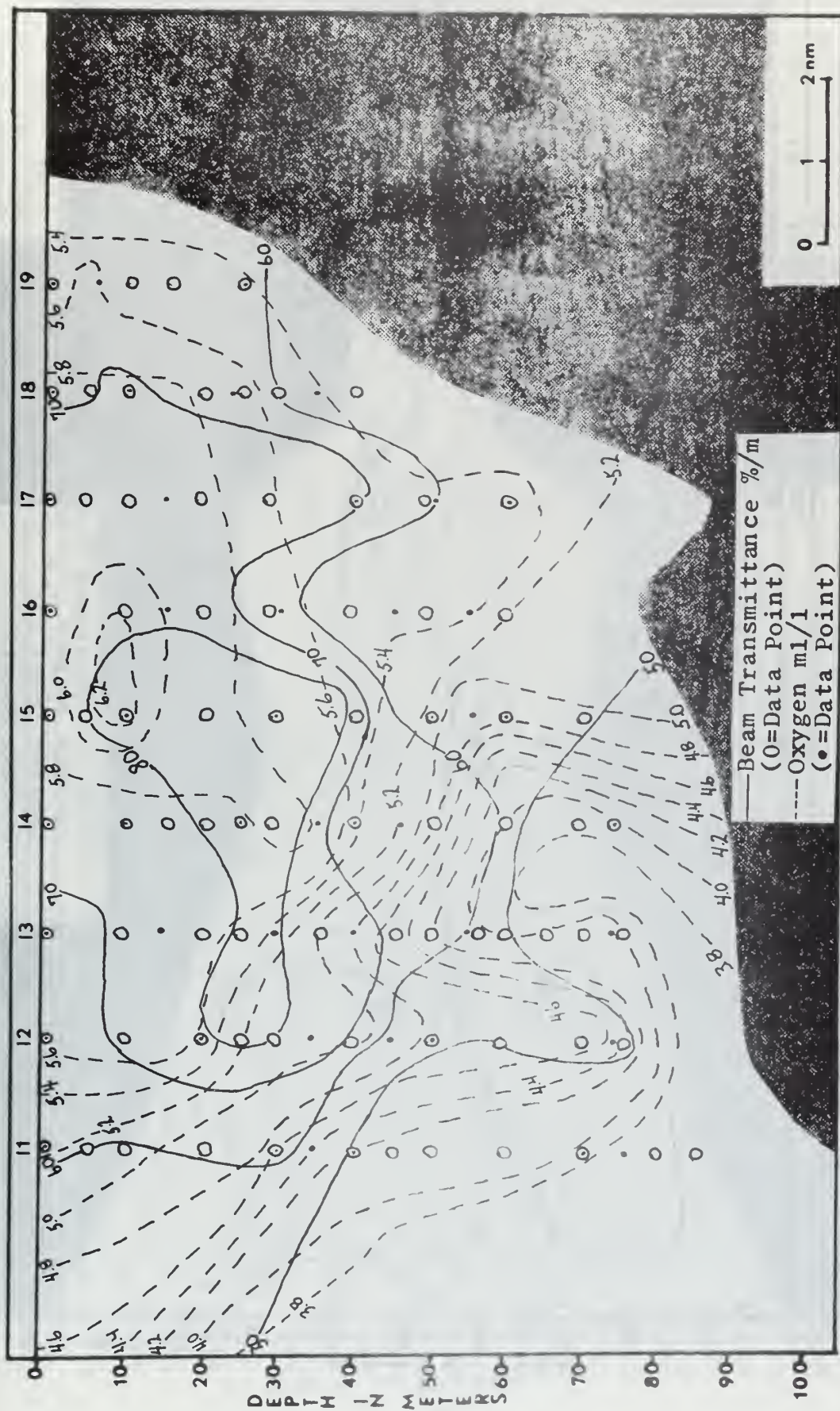


FIGURE 18

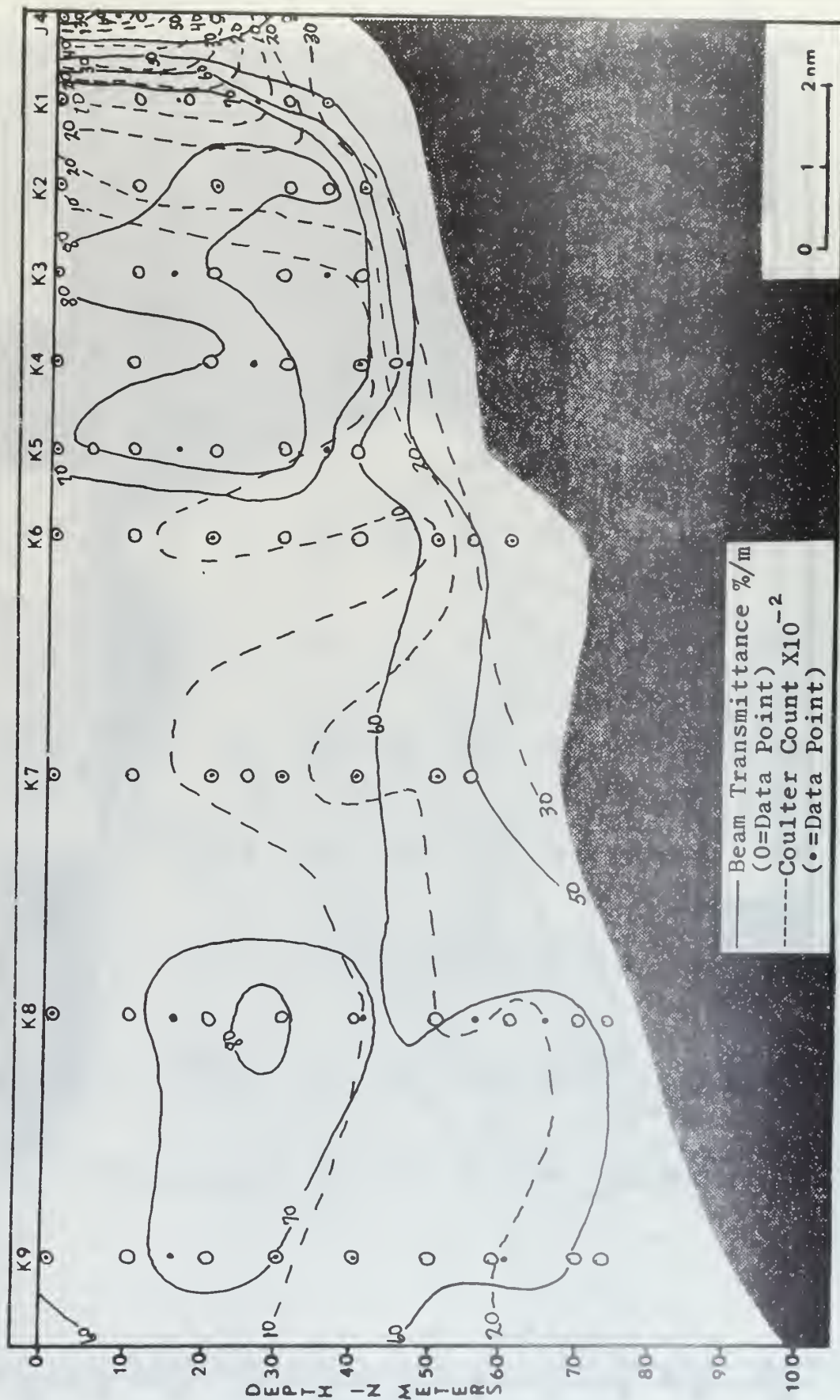


FIGURE 19



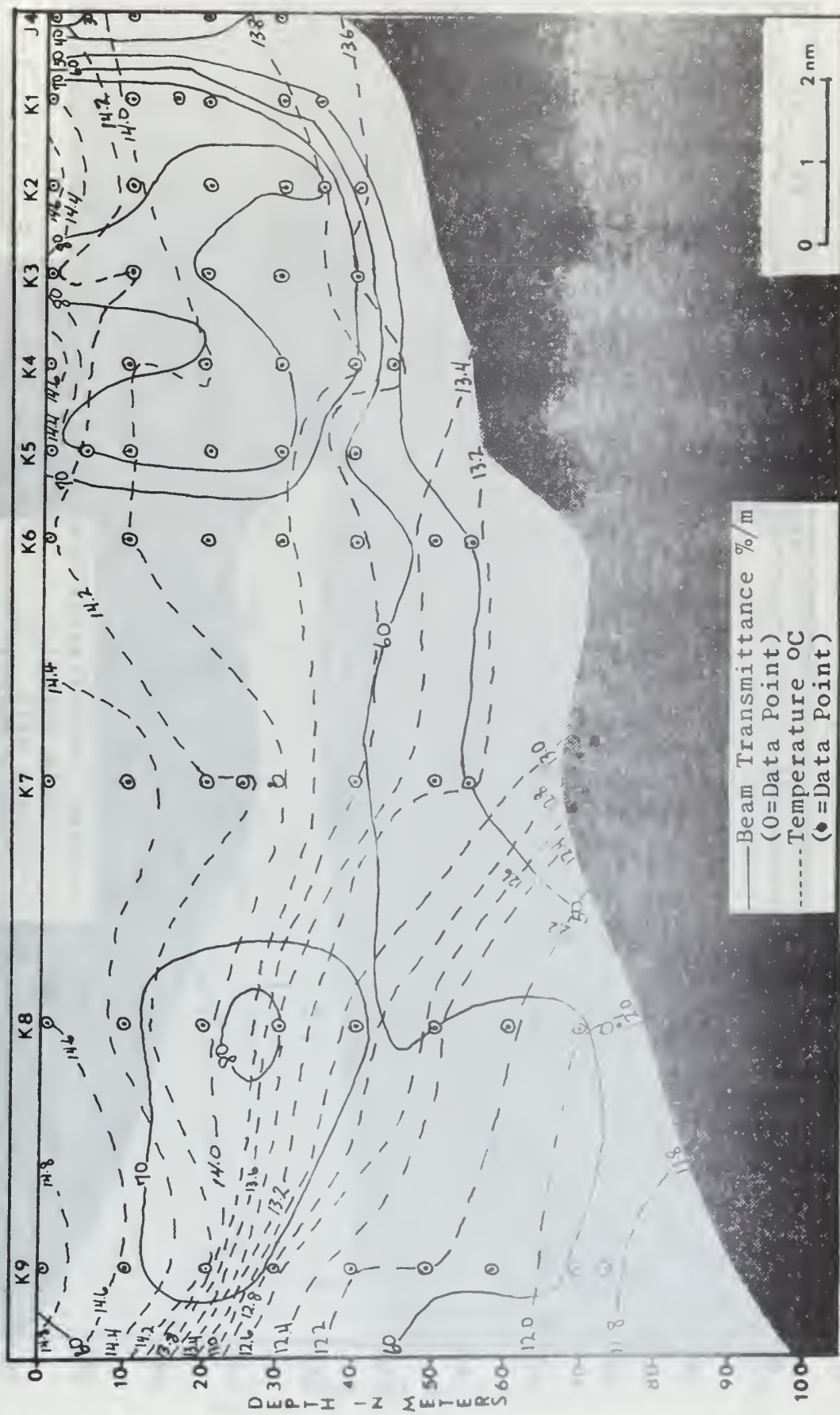


FIGURE 20

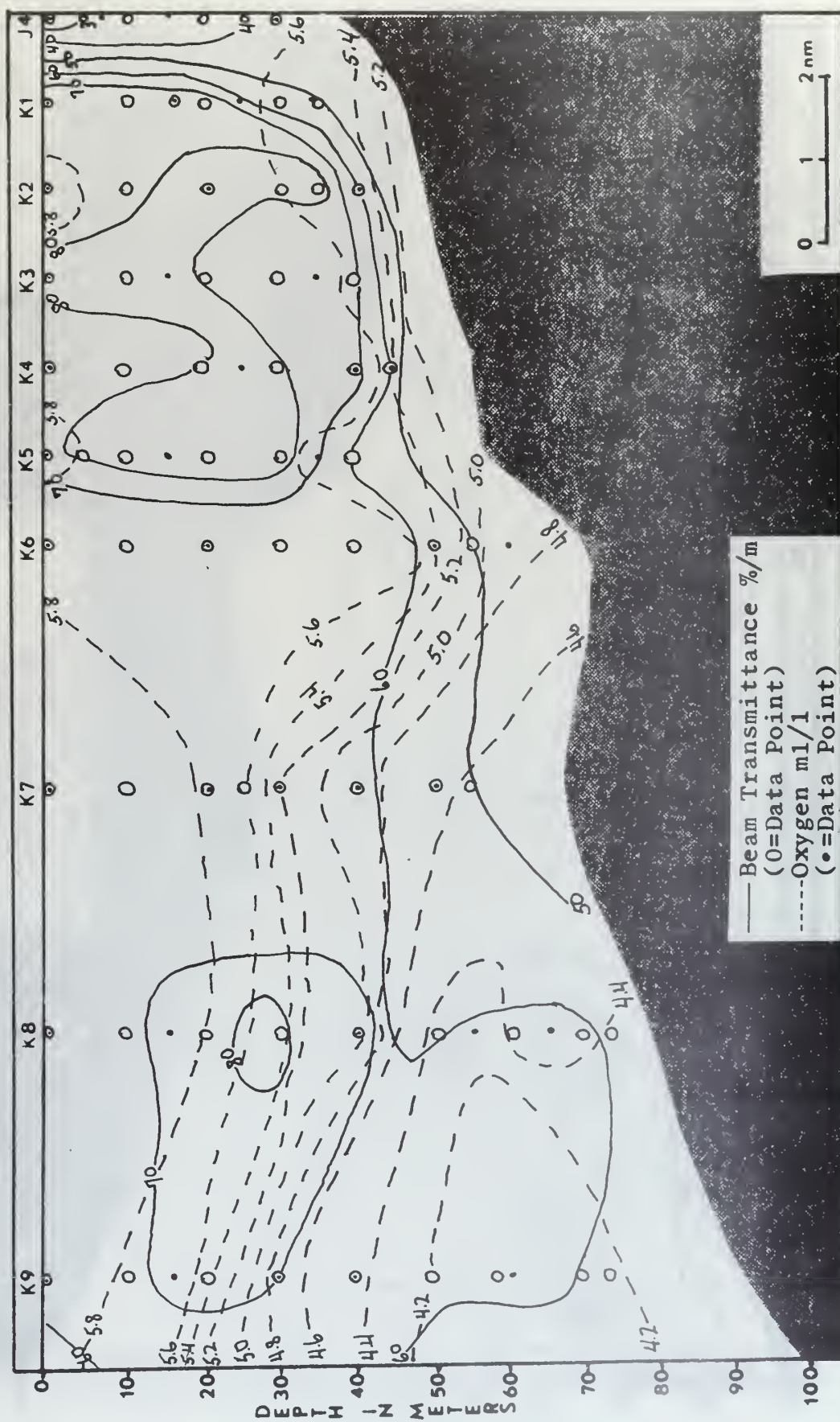


FIGURE 21



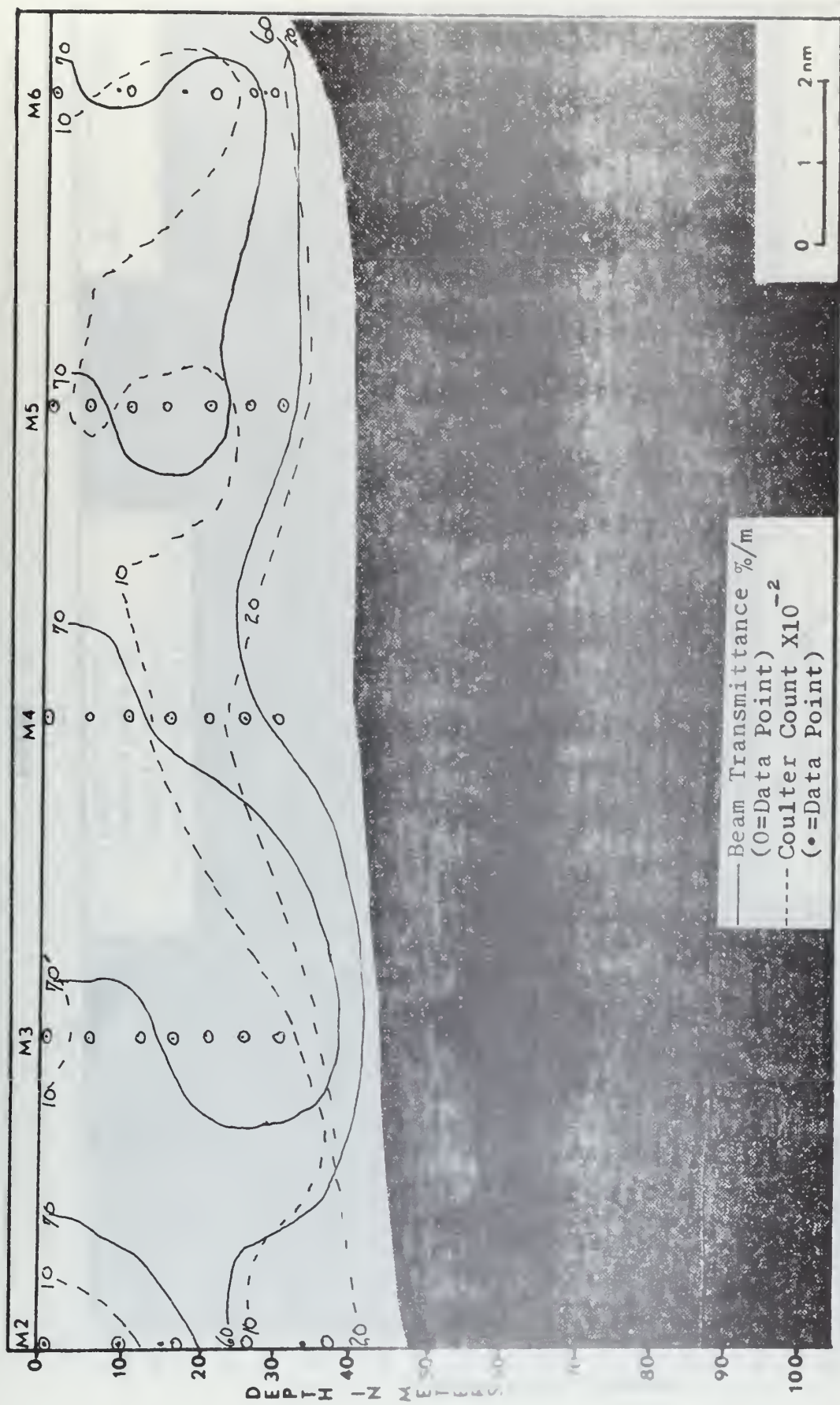


FIGURE 22



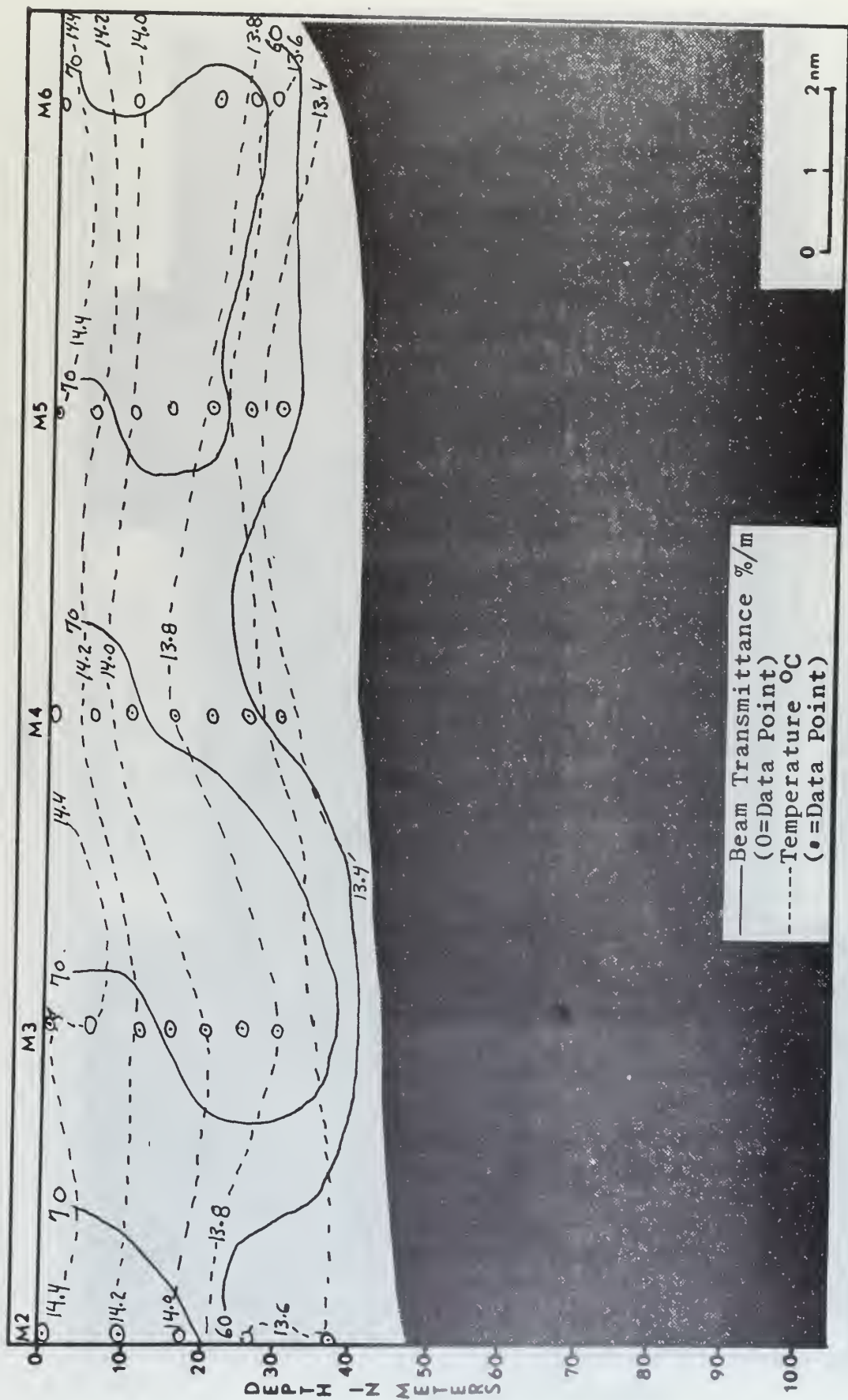


FIGURE 23

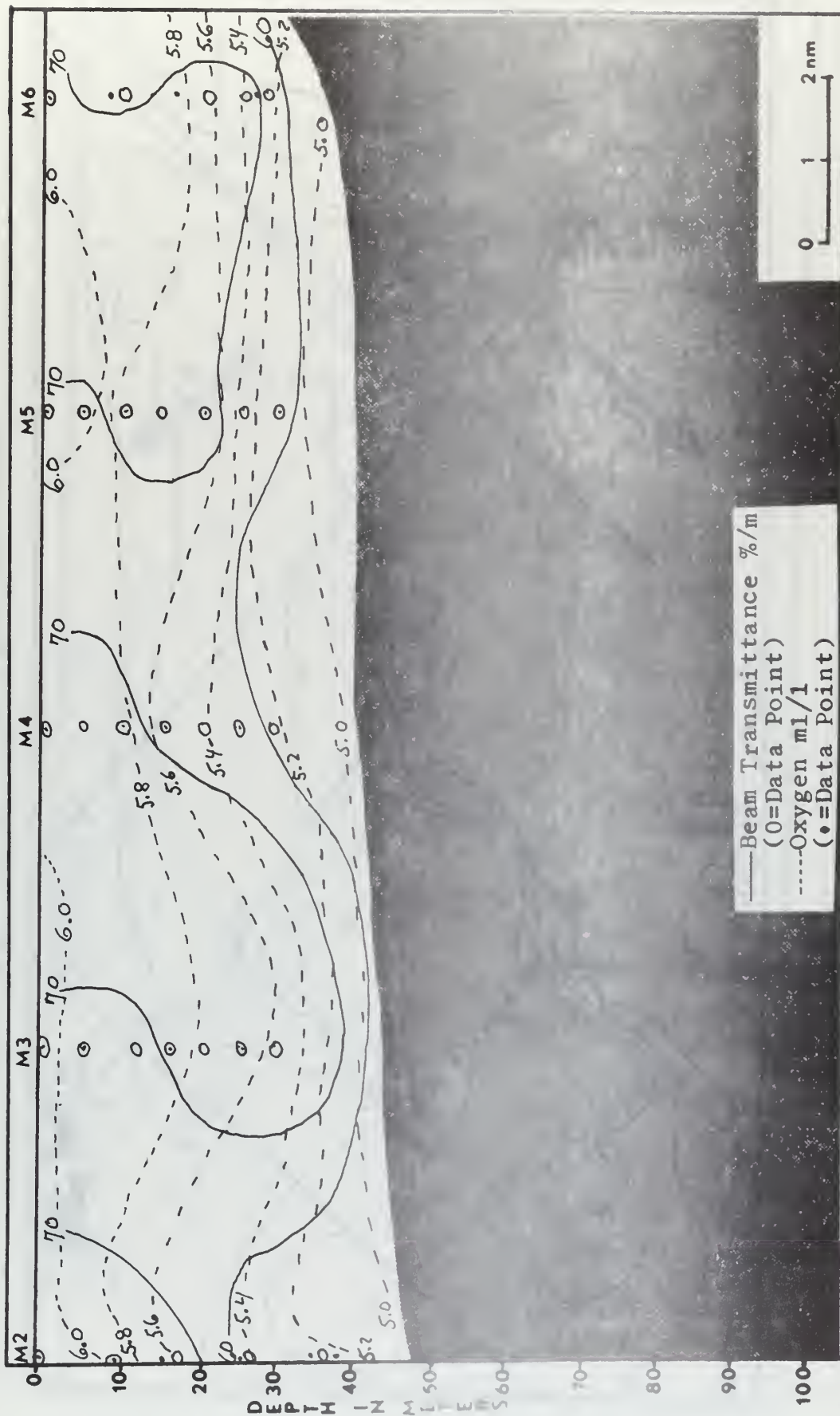
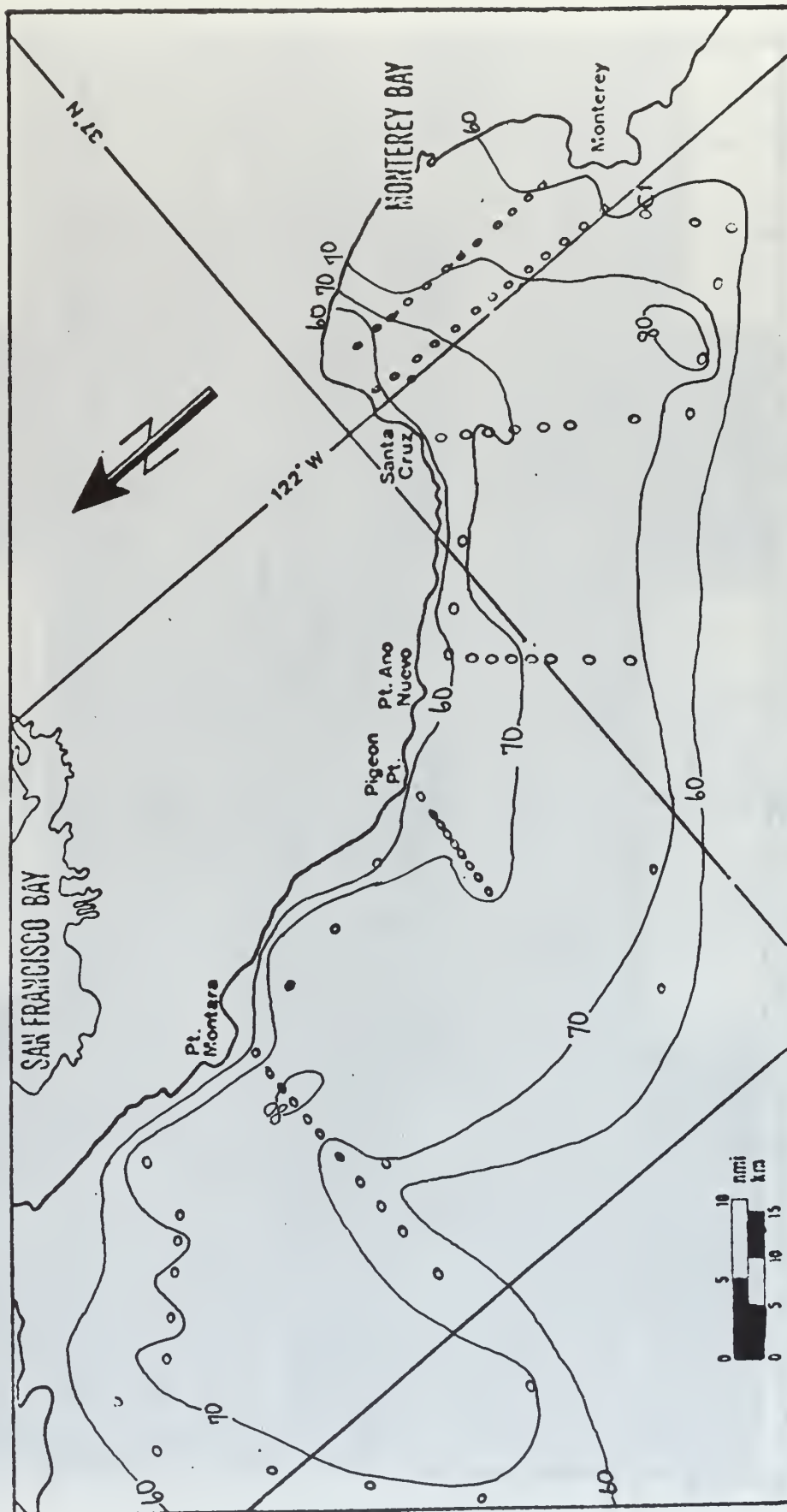
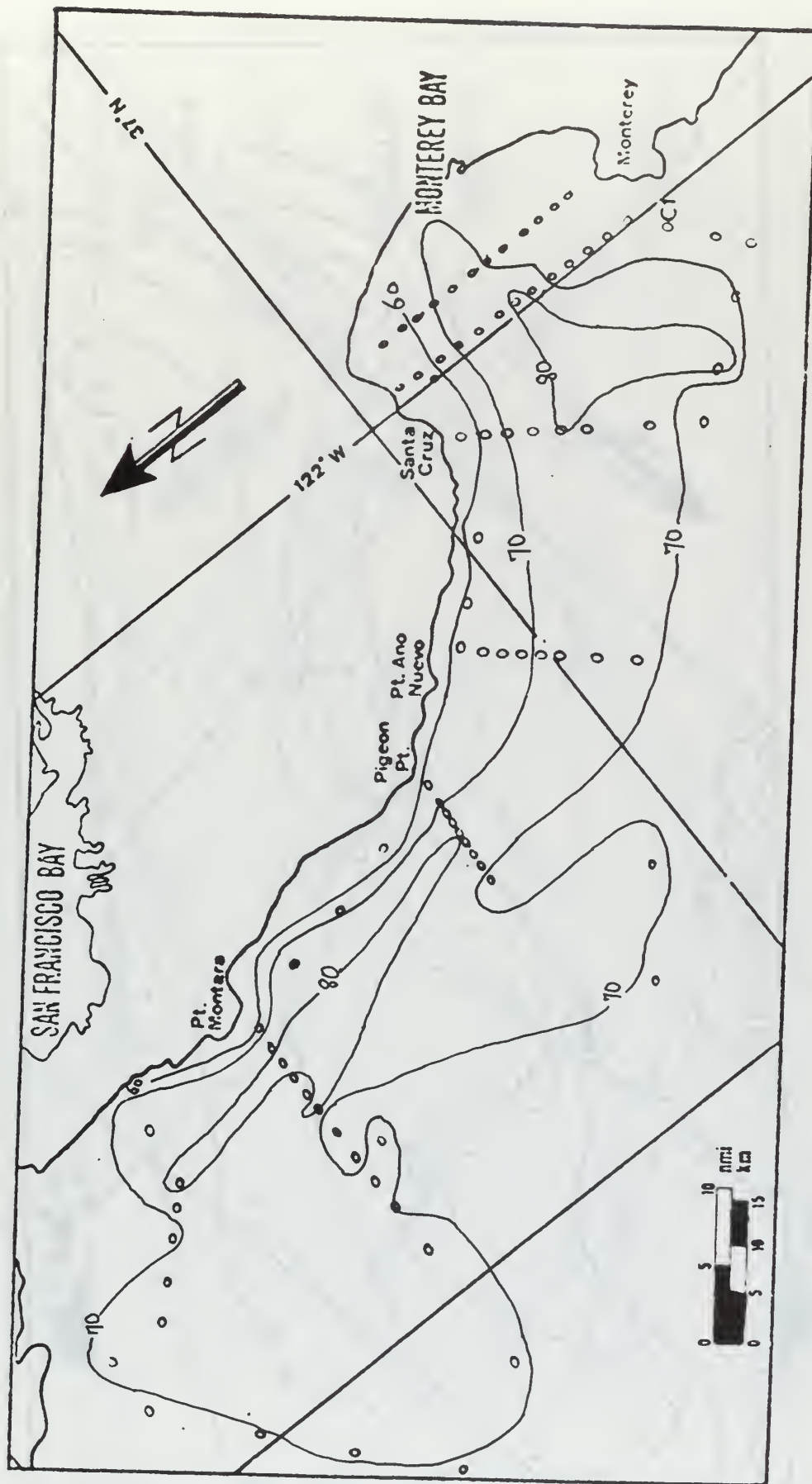


FIGURE 24



0 Meter Isolines of Beam Transmittance (%/m)

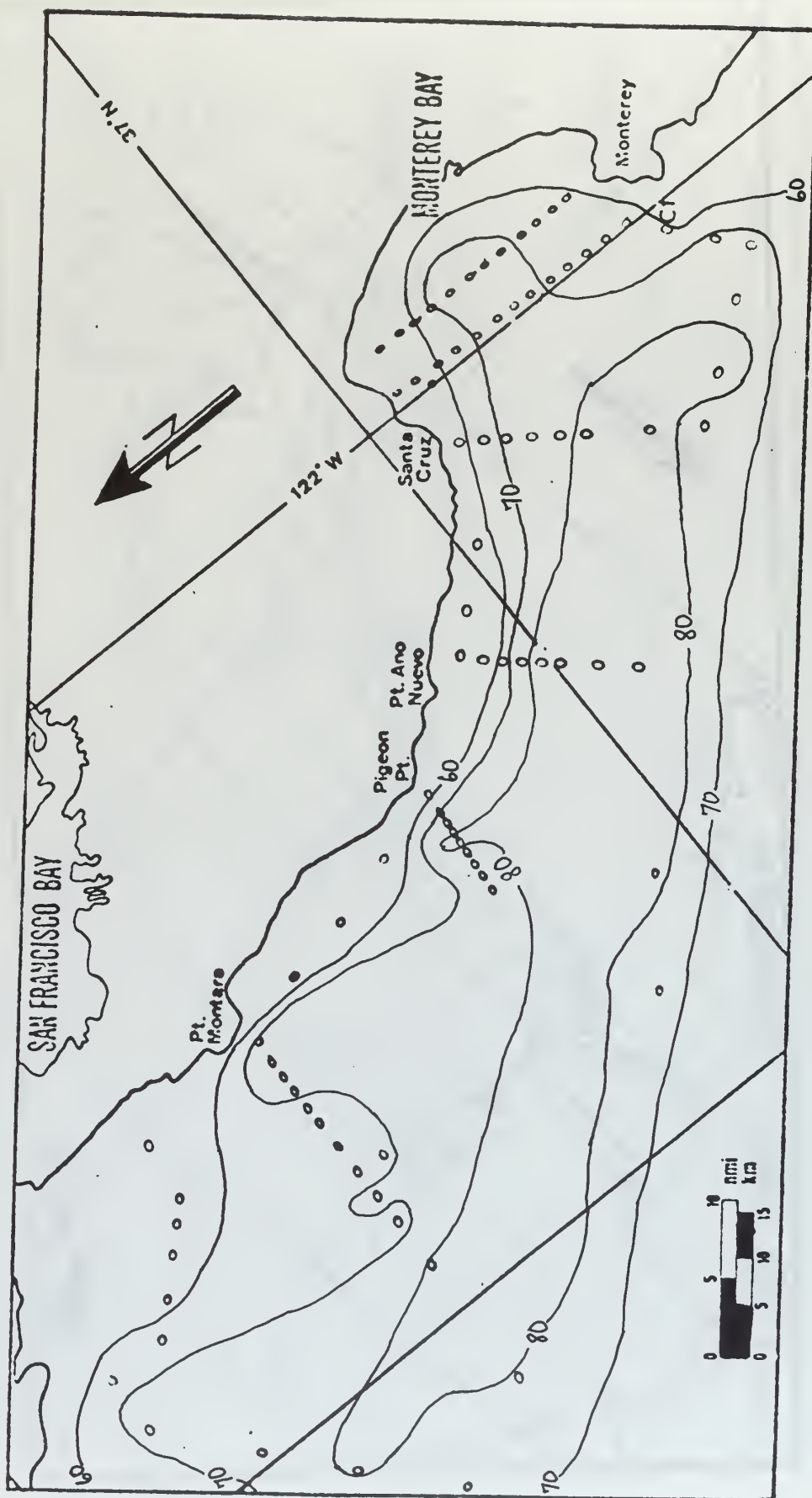
Figure 25



20 Meter Isolines of Beam Transmittance (%/m)

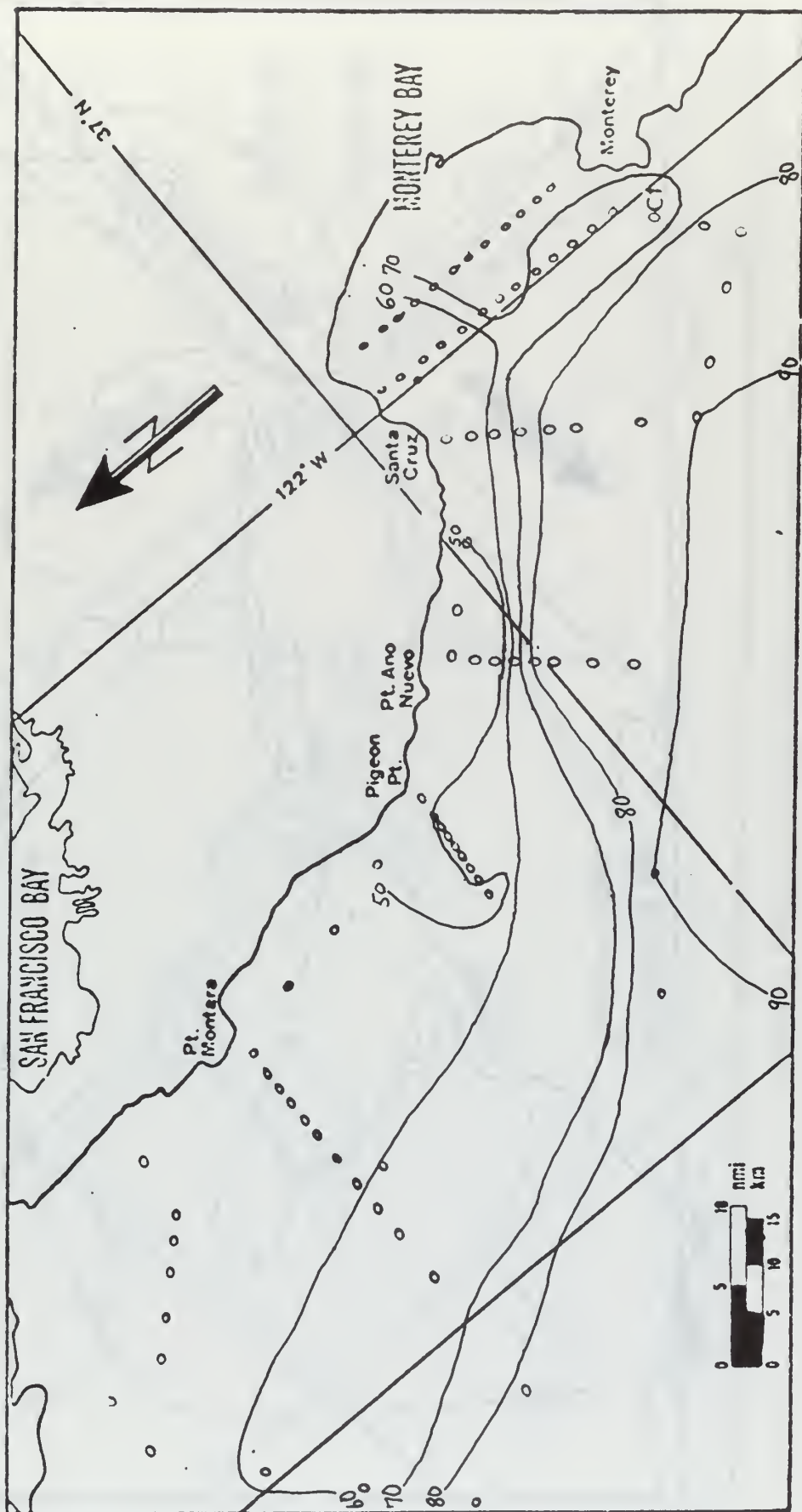
Figure 26





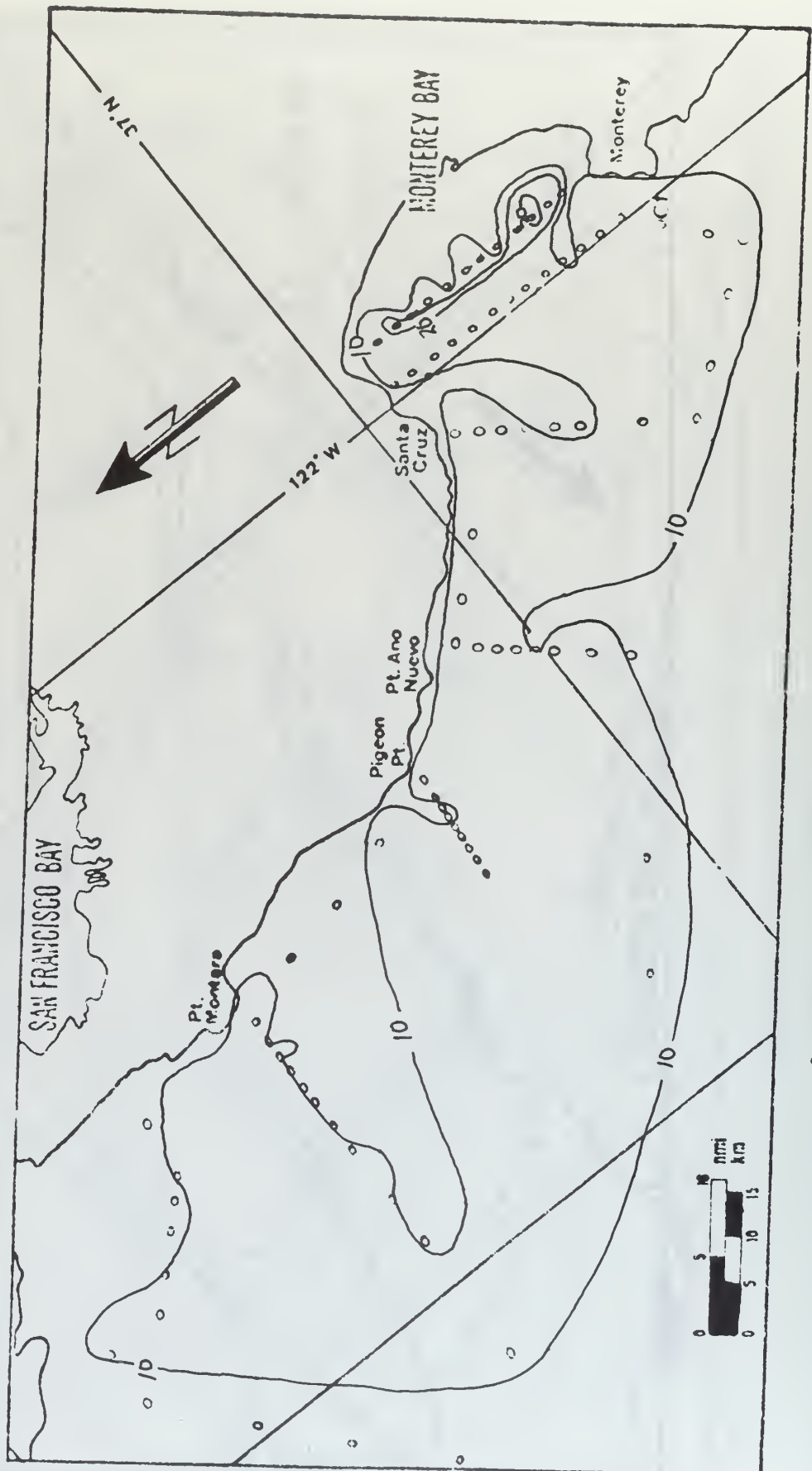
40 Meter Isolines of Beam Transmittance (%/m)

Figure 27



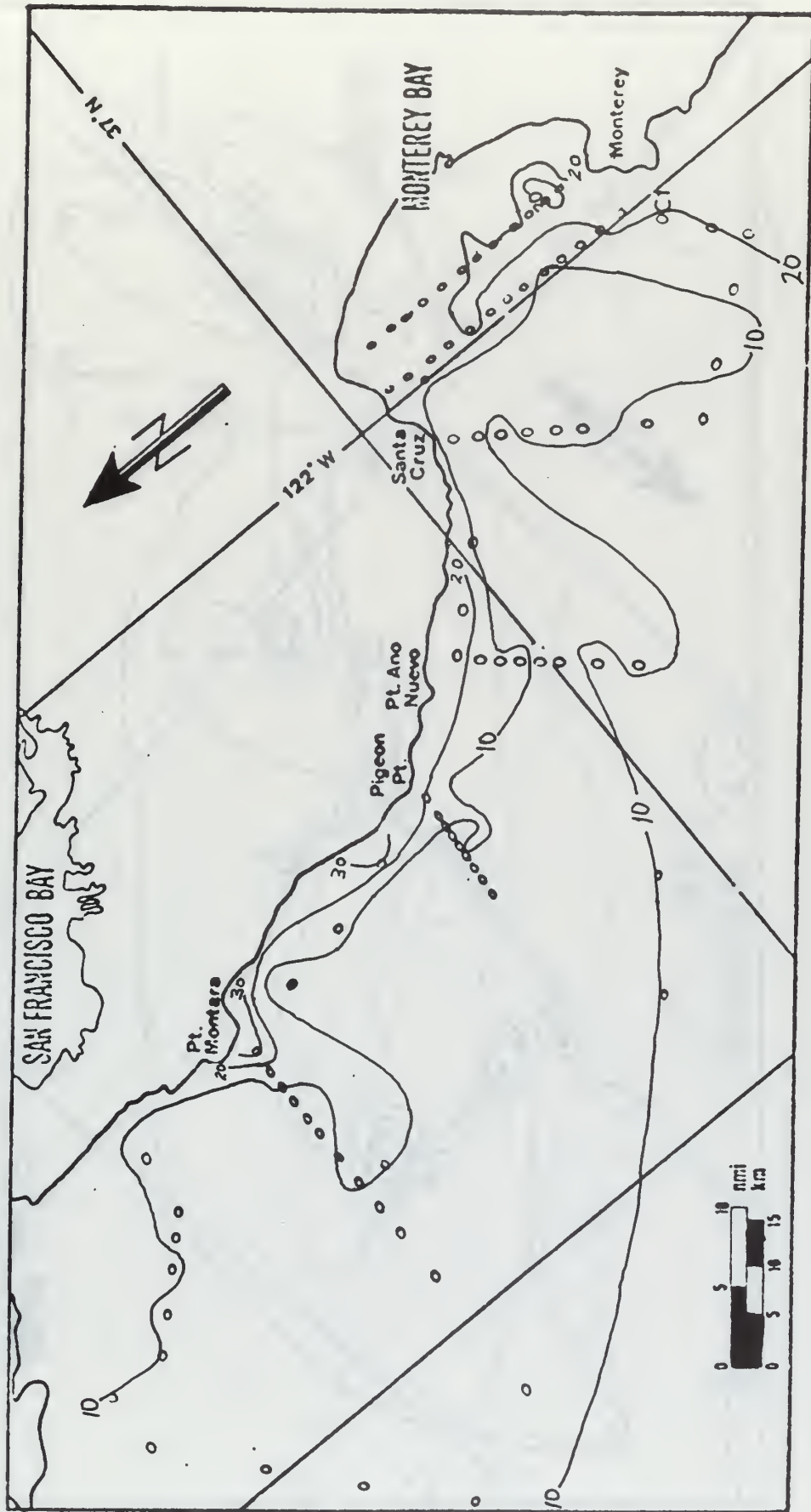
61 Meter Isolines of Beam Transmittance (%/m)

Figure 28



0 Meter Isolines of Total Coulter Count ( $\times 10^{-2}$ )

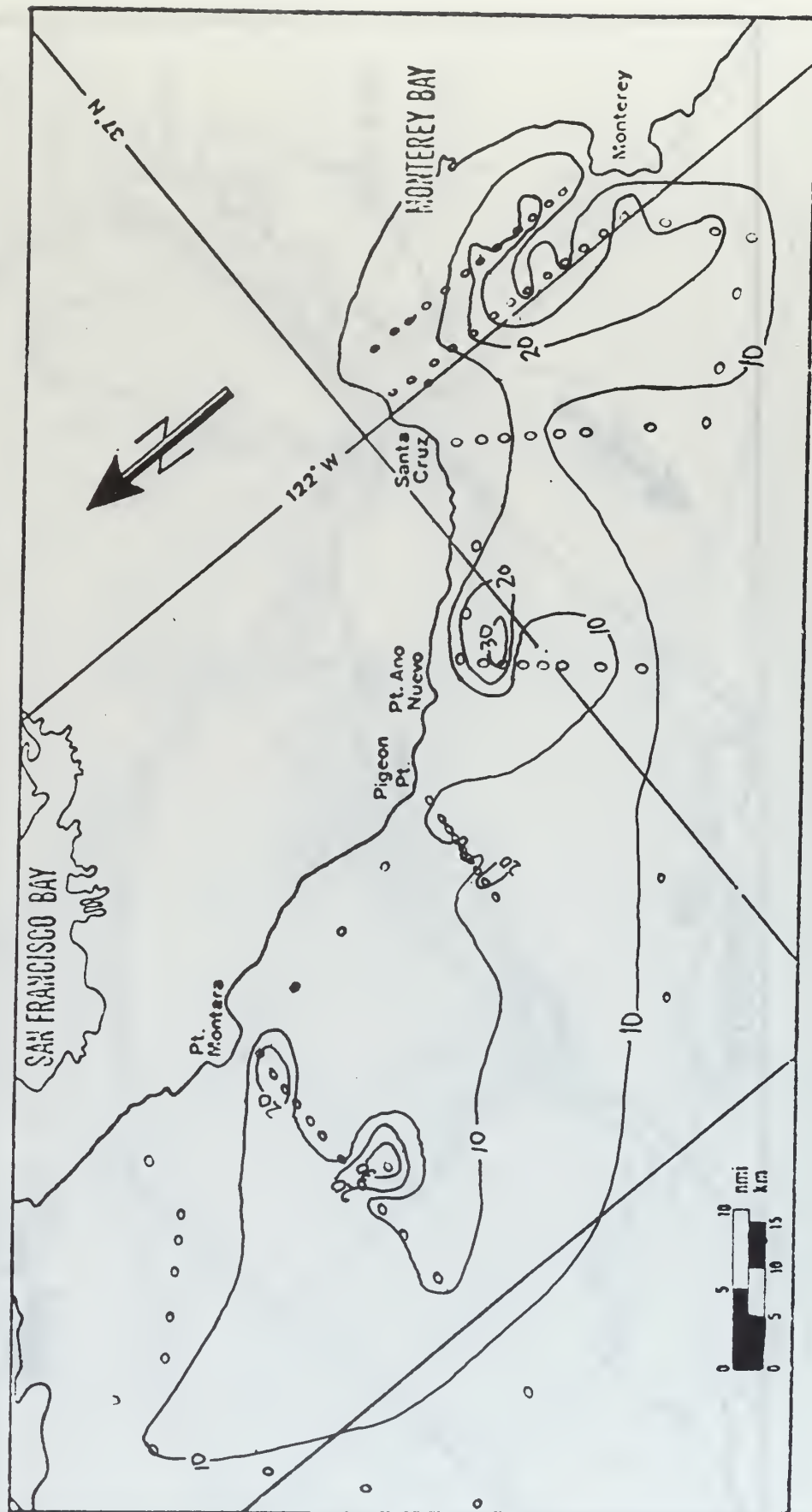
Figure 29



20 Meter Isolines of Total Coulter Count ( $\times 10^{-2}$ )

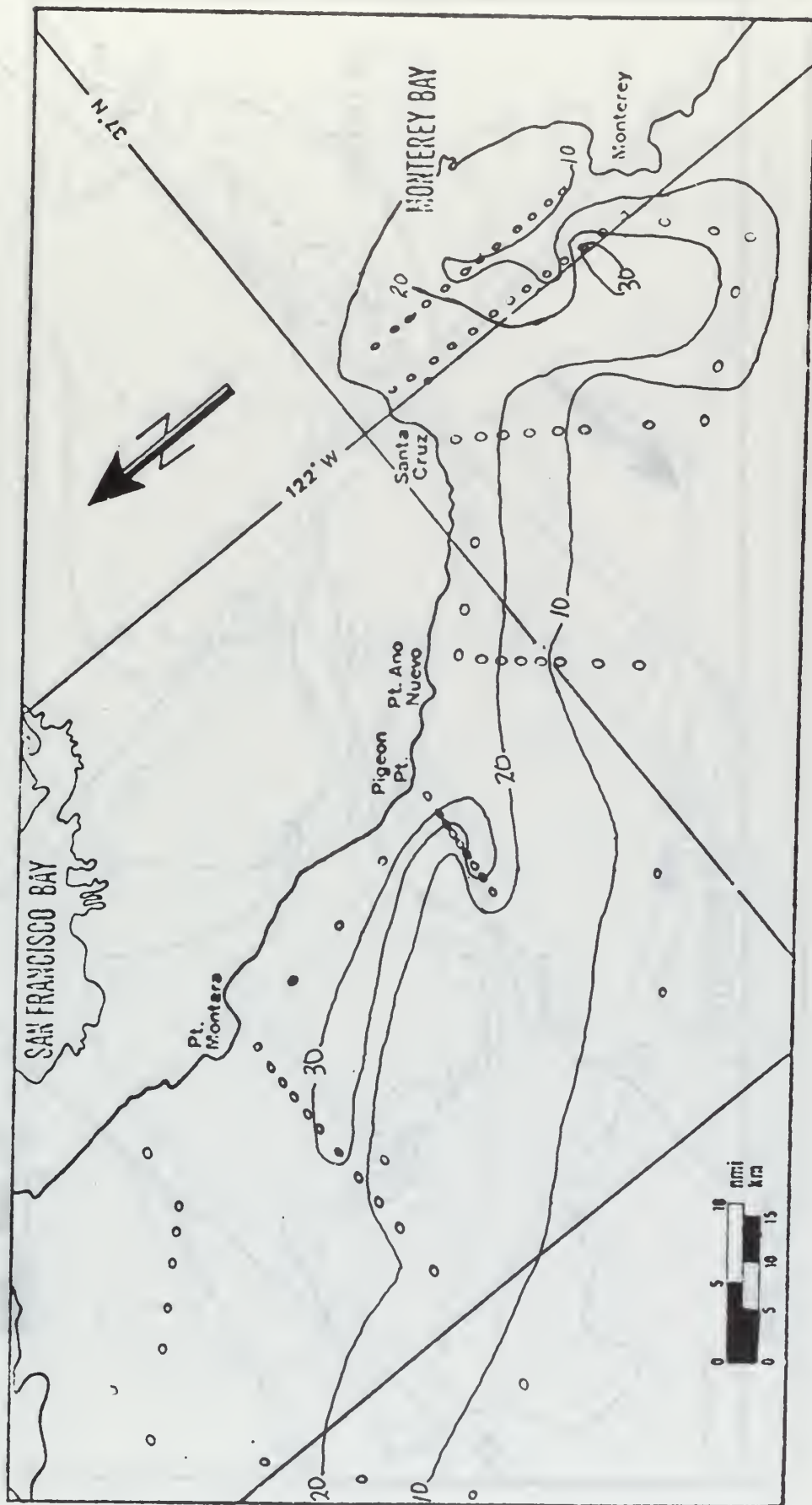
Figure 30





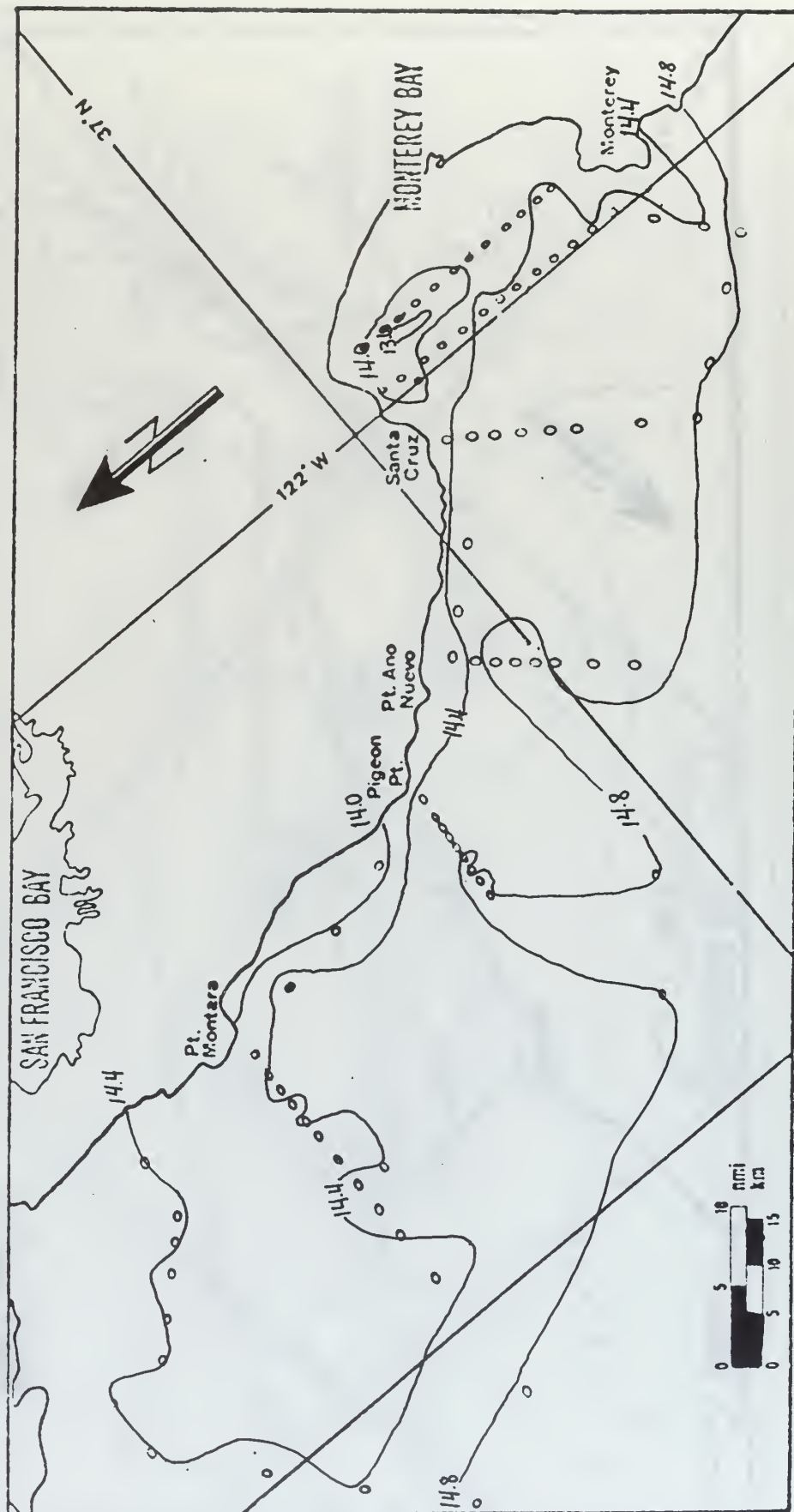
40 Meter Isolines of Total Coulter Count ( $\times 10^{-2}$ )

Figure 31

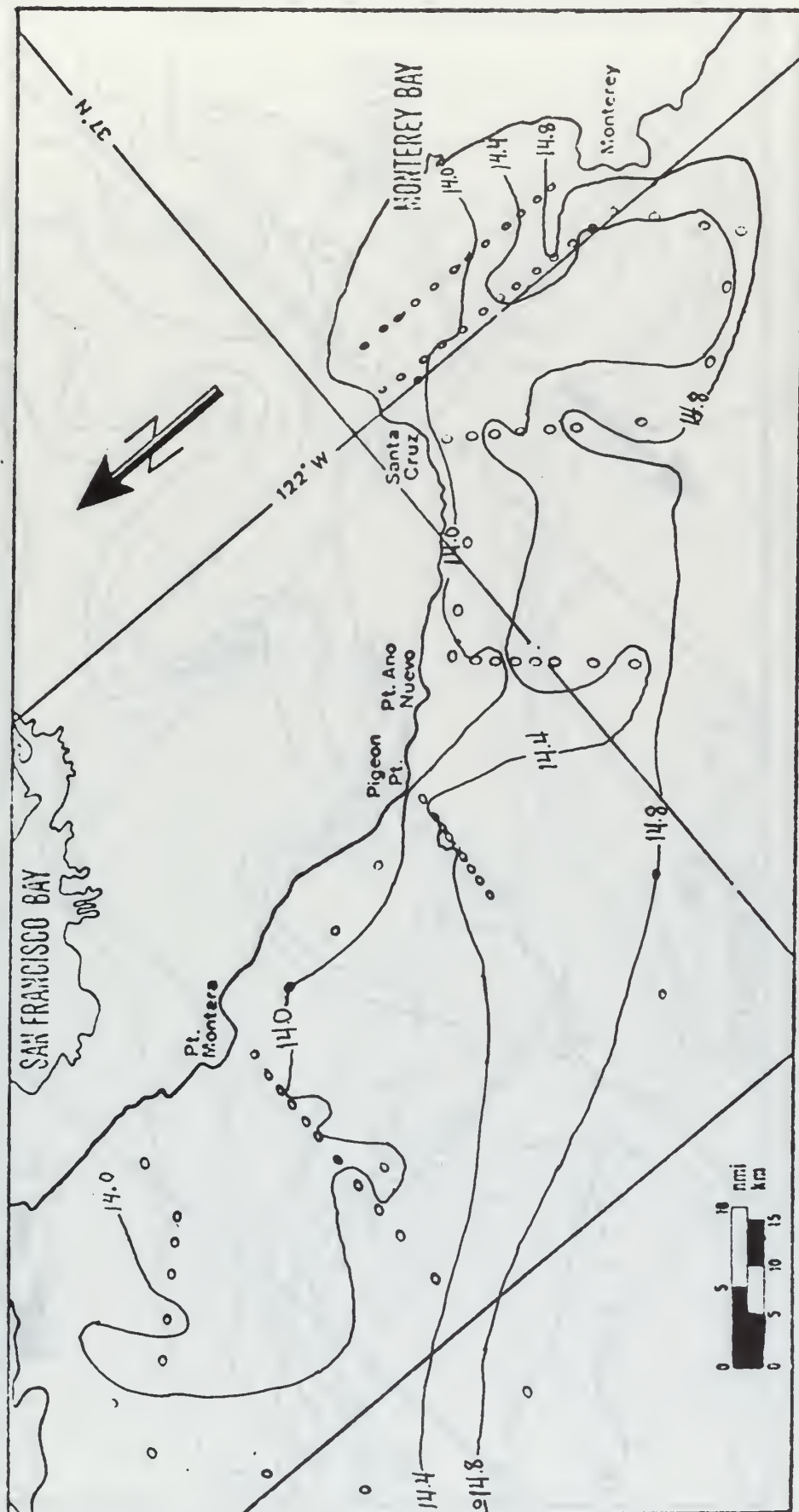


61 Meter Isolines of Total Coulter Count ( $\times 10^{-2}$ )

Figure 32



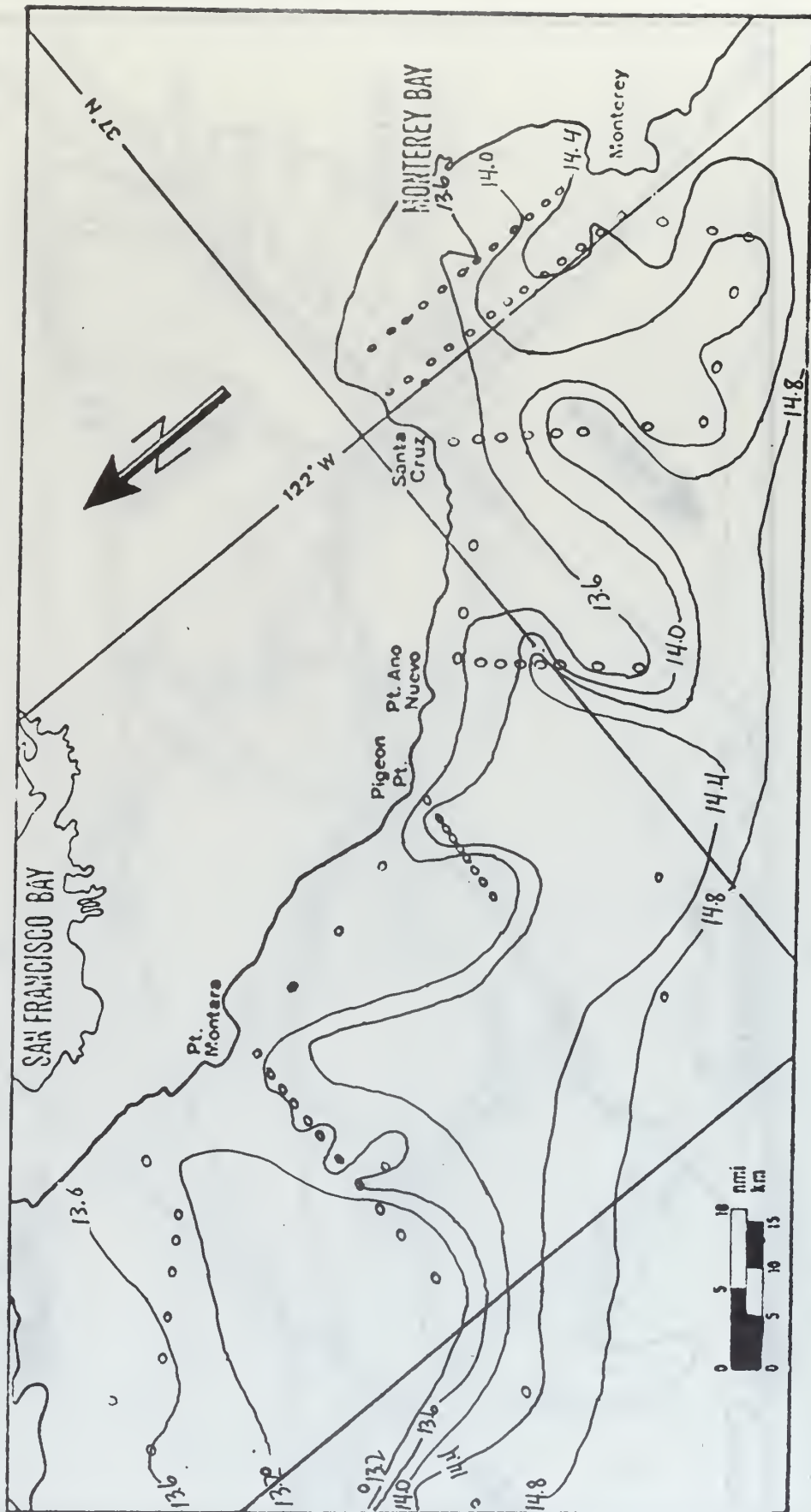
0 Meter Isotherms ( $^{\circ}\text{C}$ )  
Figure 33



20 Meter Isotherms ( $^{\circ}\text{C}$ )

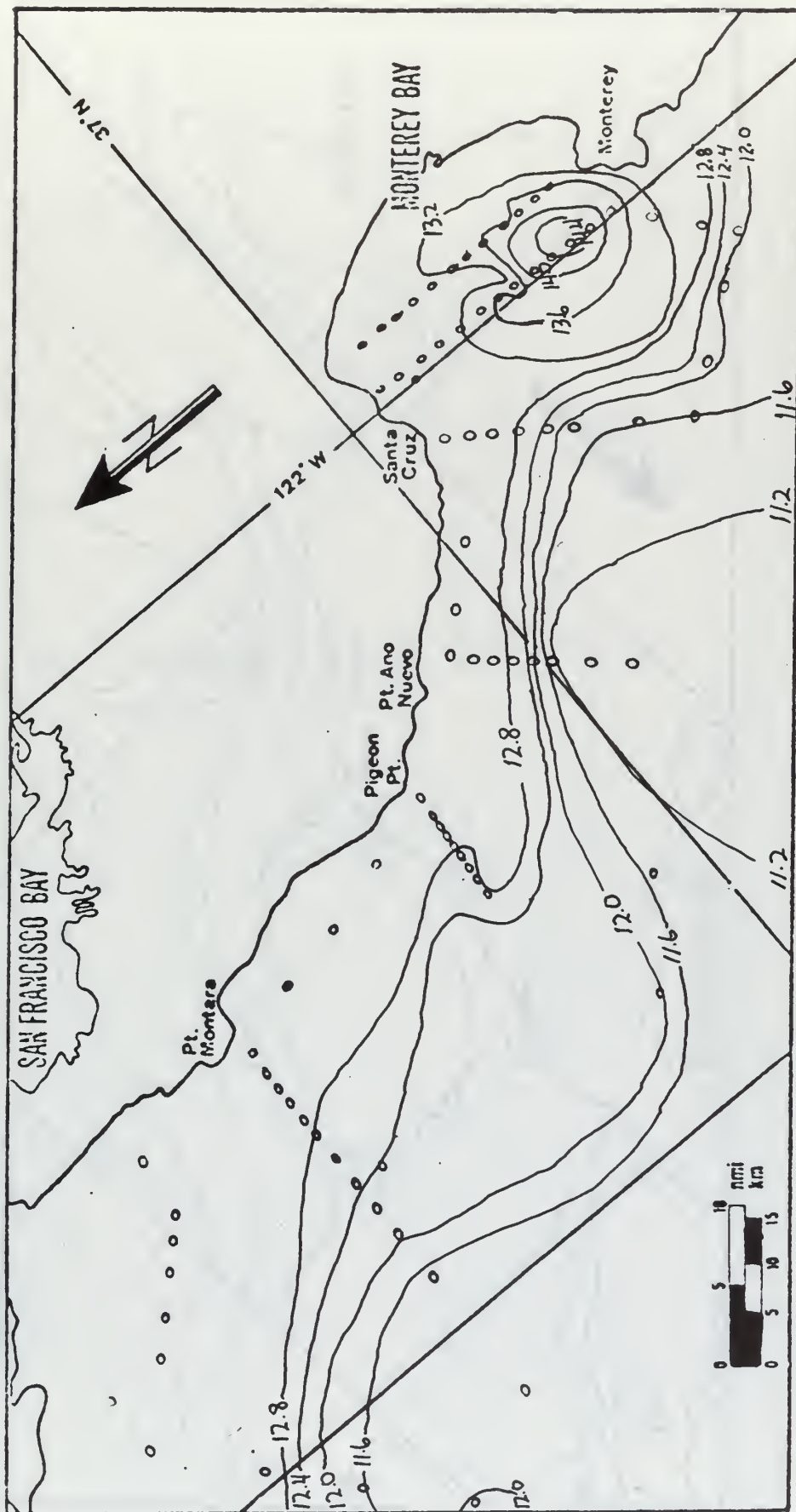
Figure 34





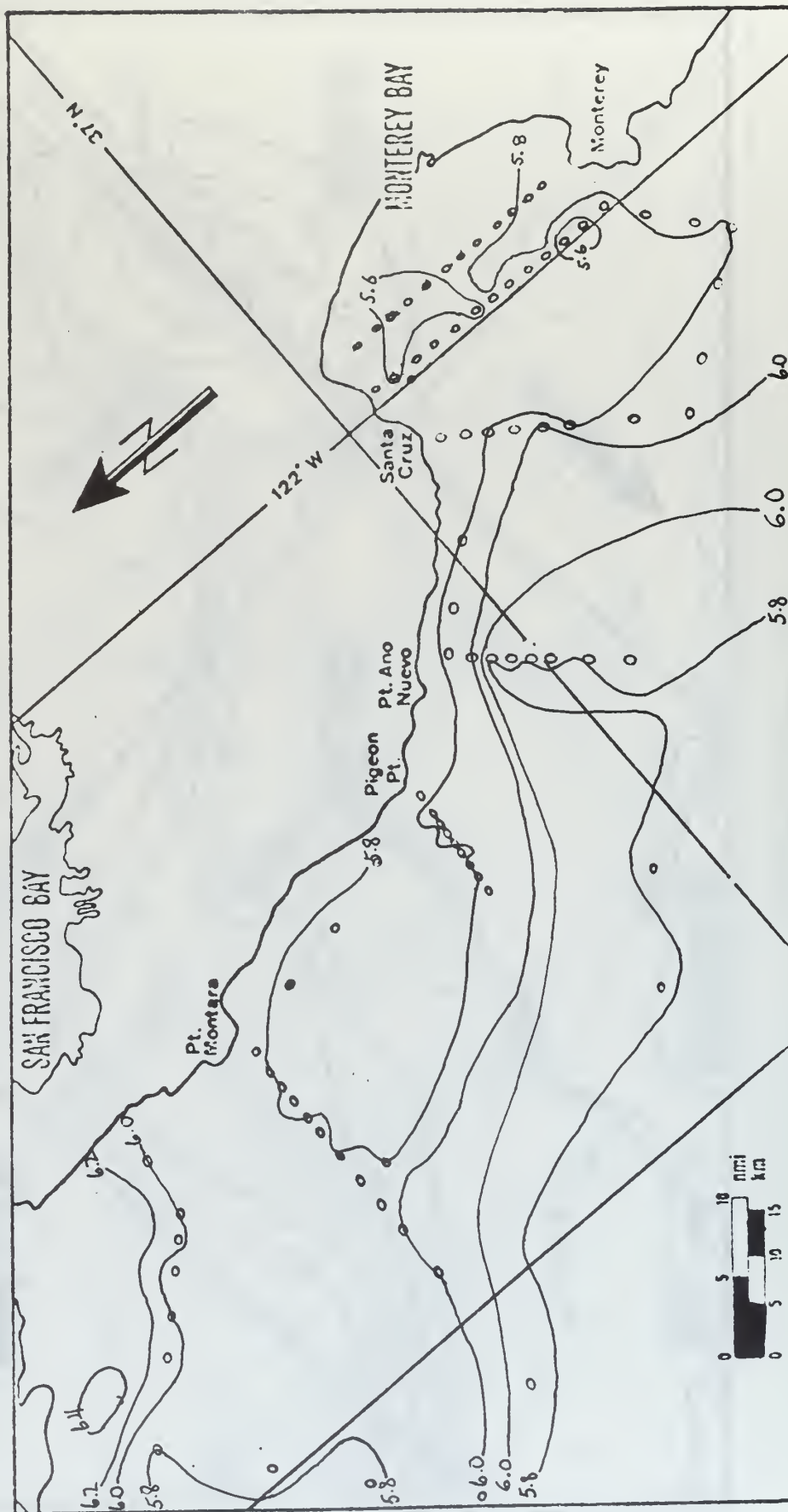
40 Meter Isotherms ( $^{\circ}\text{C}$ )

Figure 35



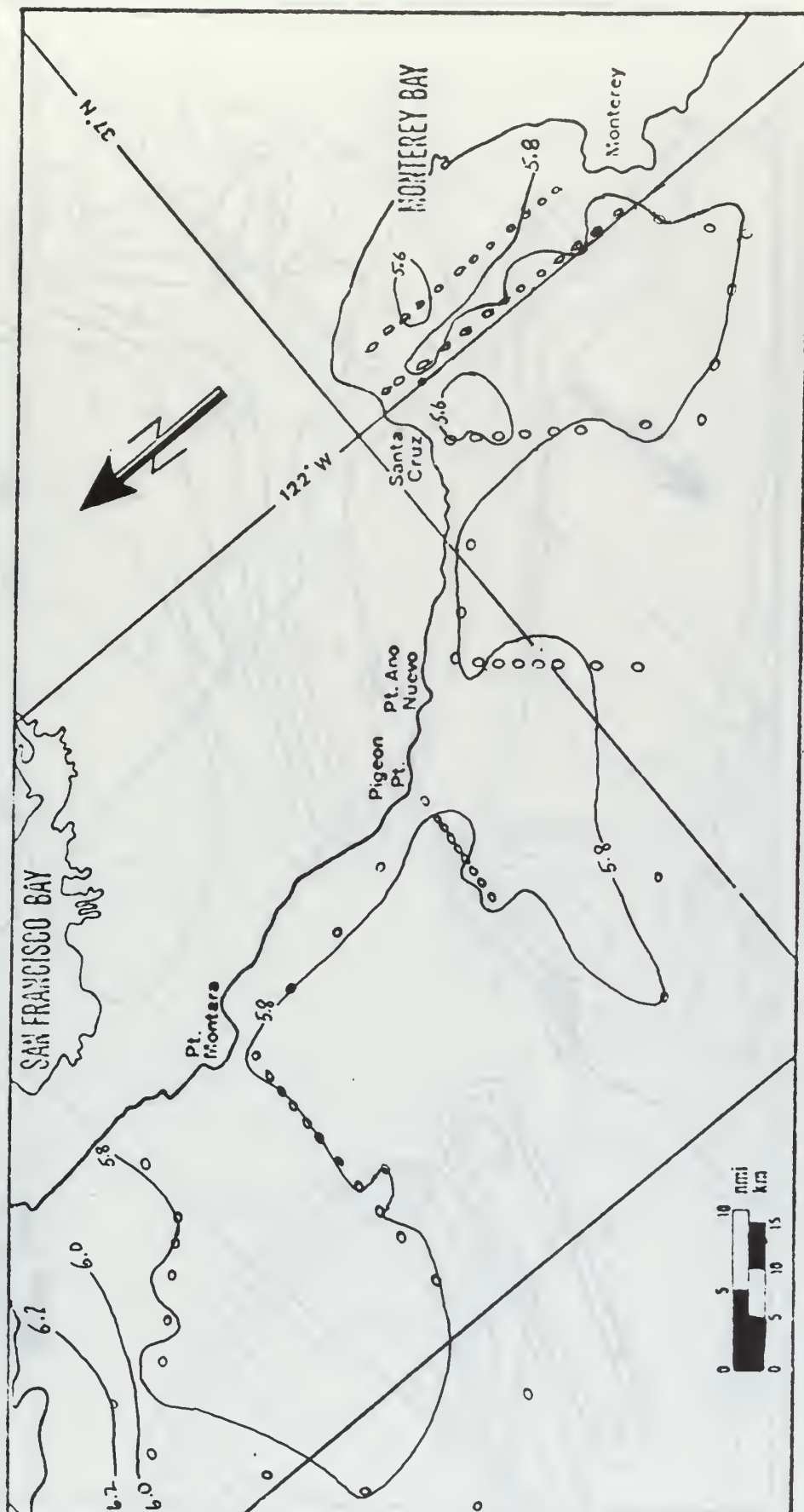
61 Meter Isotherms ( $^{\circ}\text{C}$ )

Figure 36



0 Meter Isolines of Oxygen Content (ml/l)

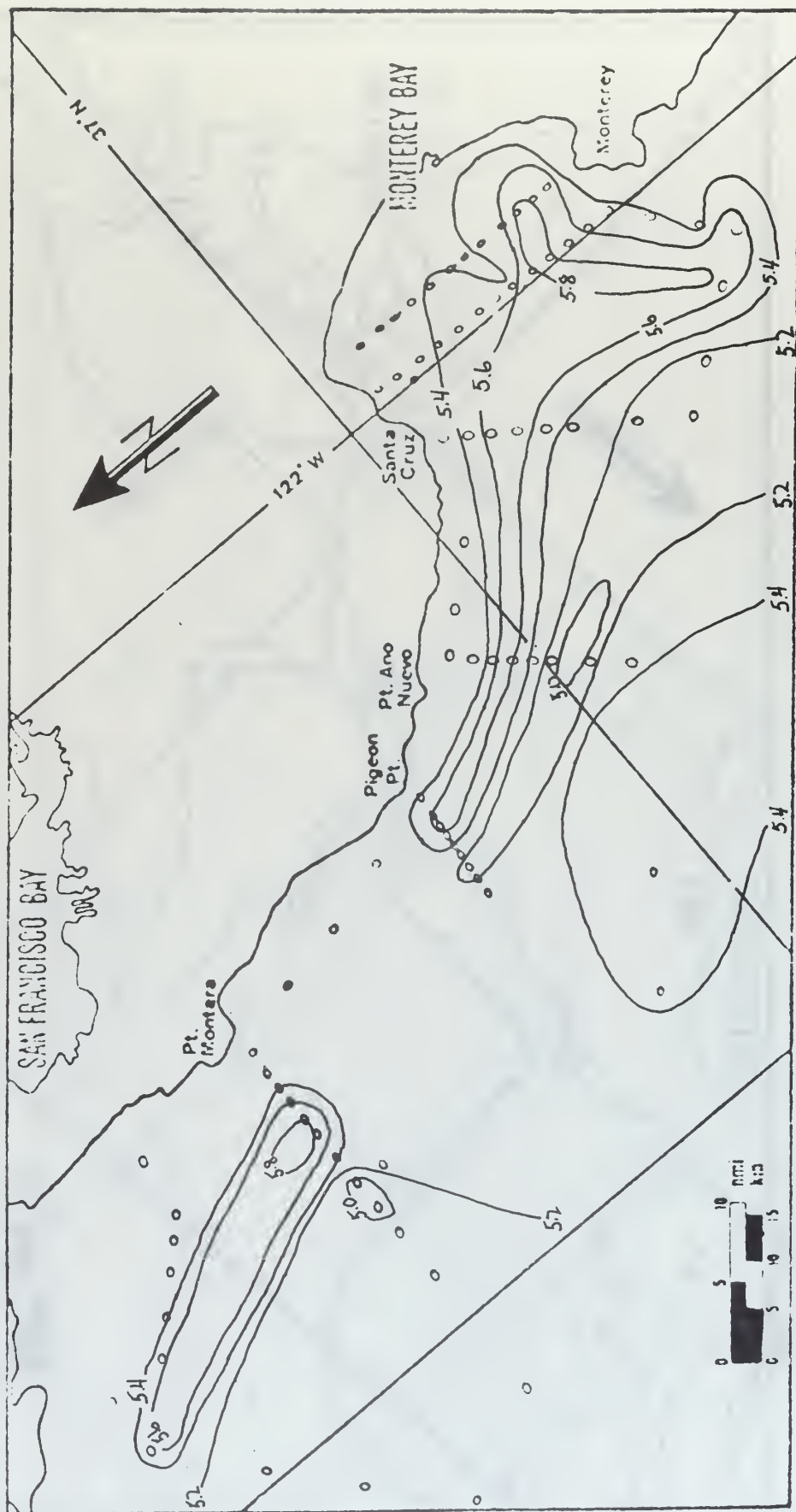
Figure 37



20 Meter Isolines of Oxygen Content (ml/l)

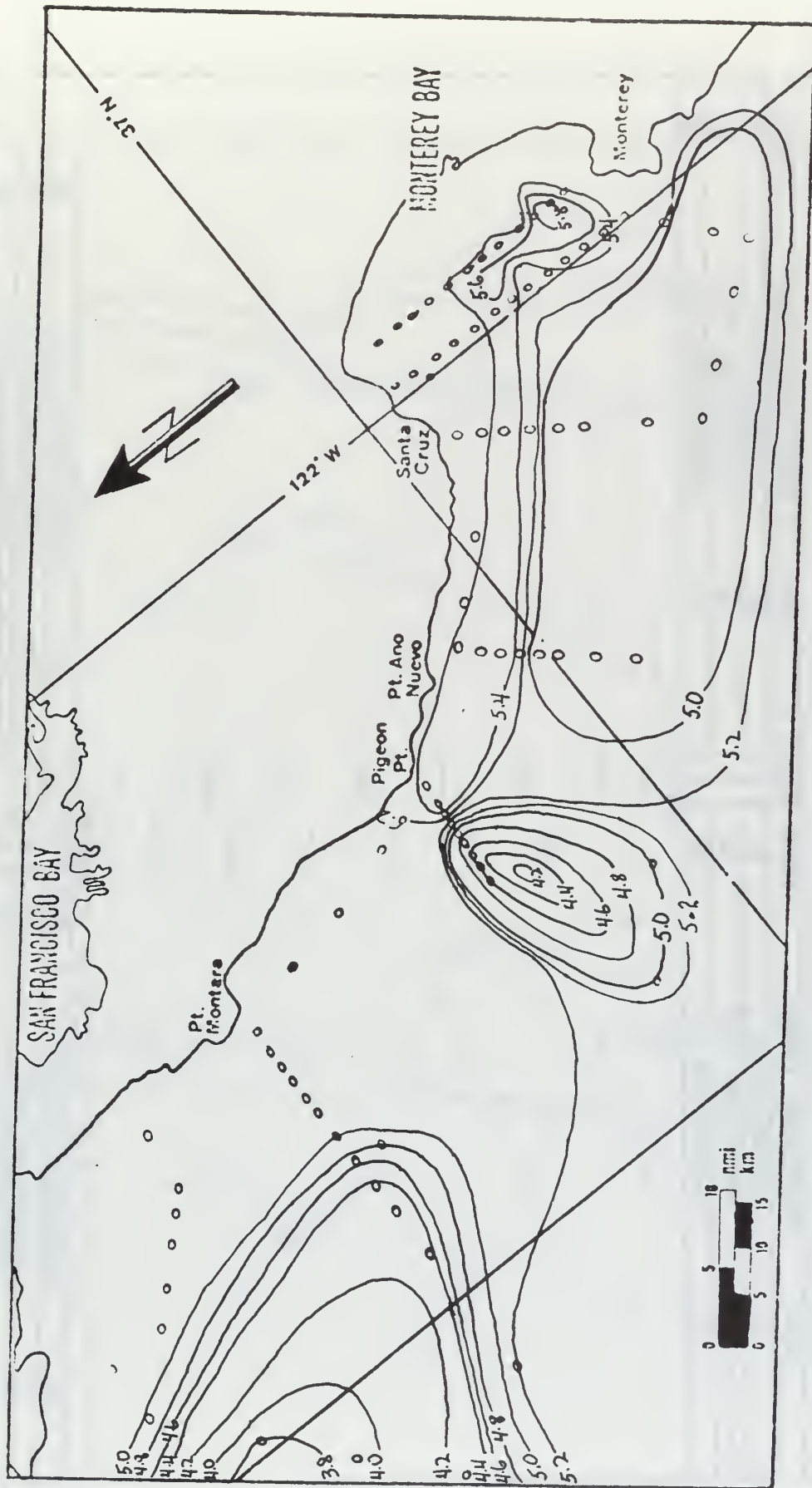
Figure 38





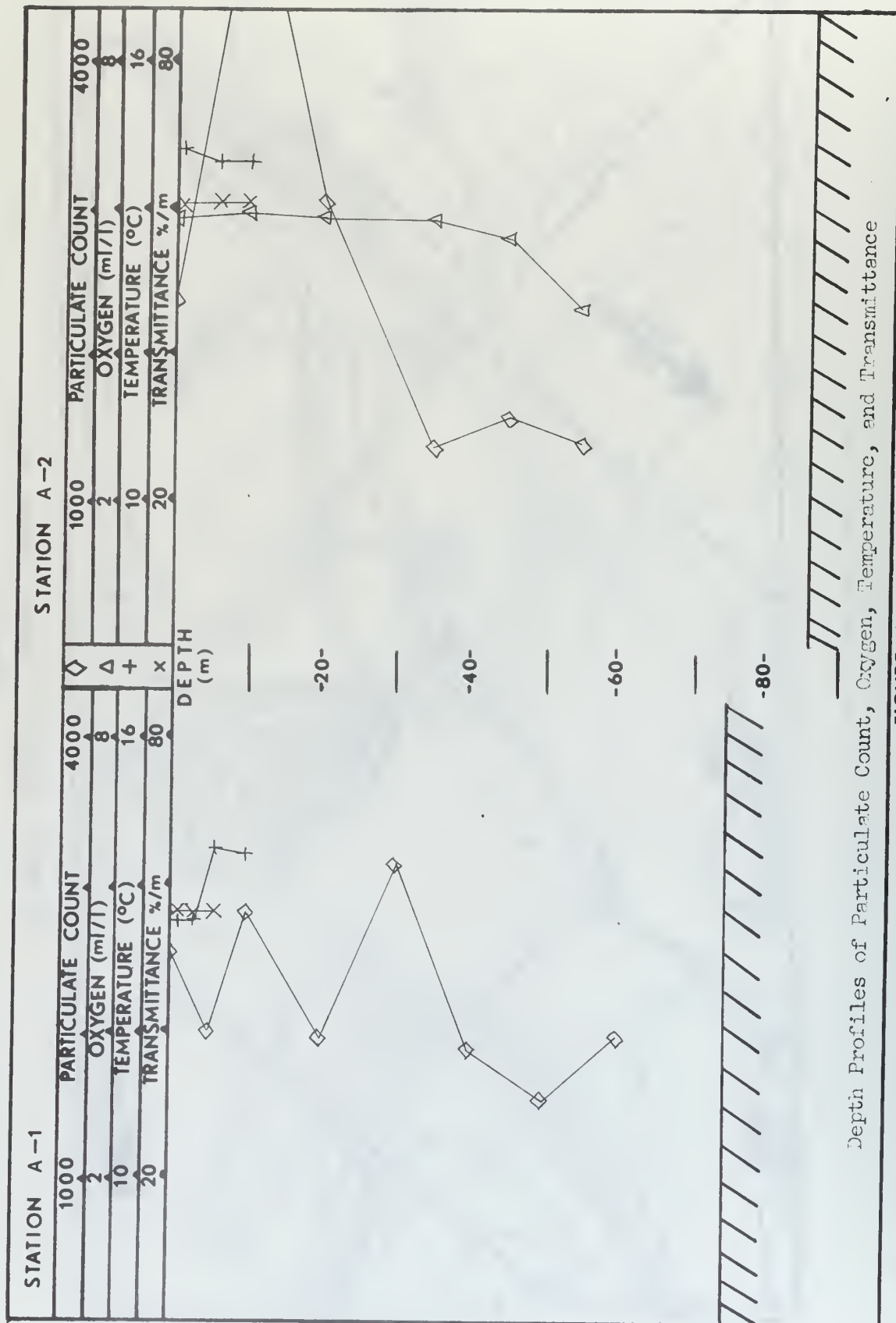
40 Meter Isolines of Oxygen Content (ml/l)

Figure 39



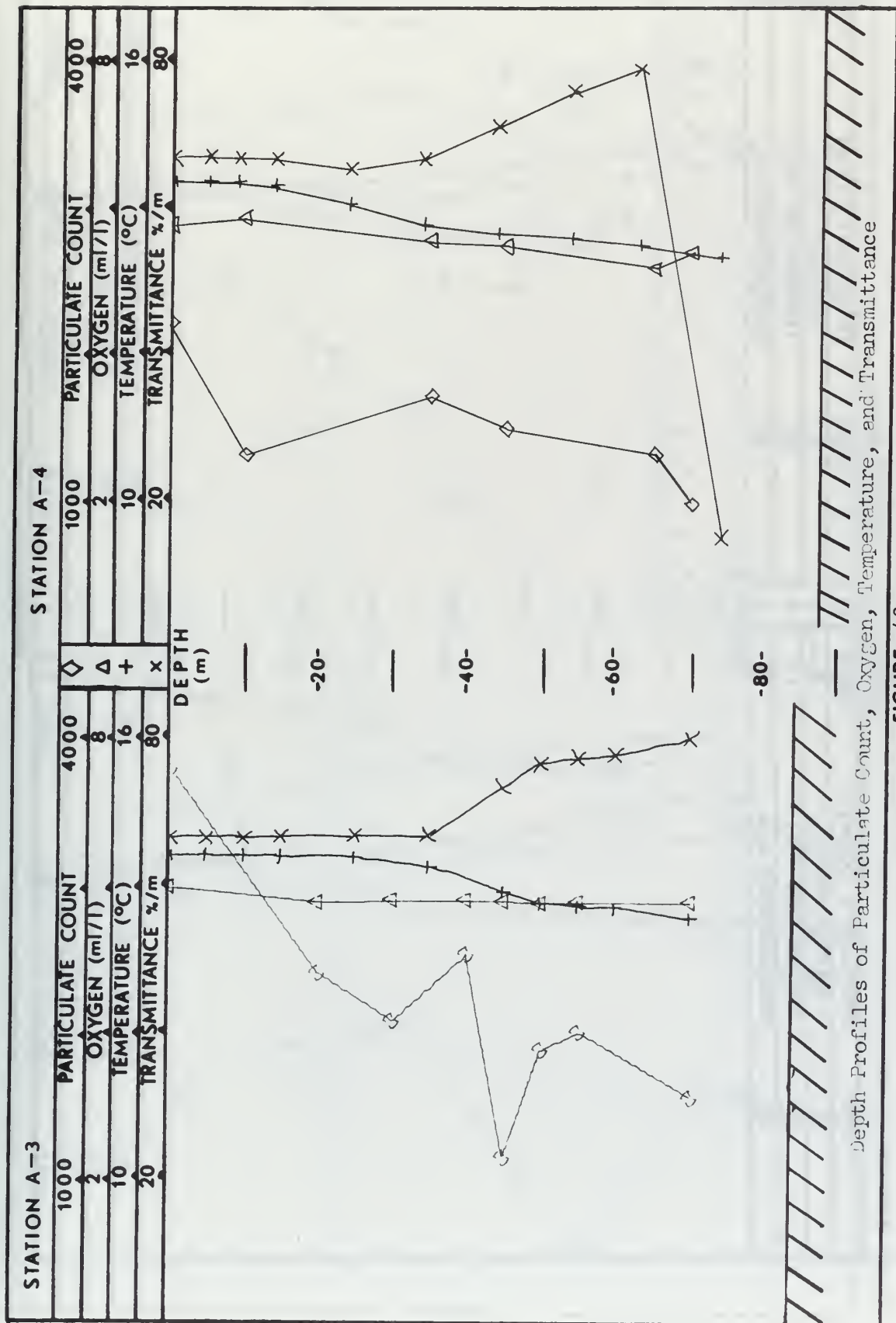
61 Meter Isolines of Oxygen Content (ml/l)

Figure 40



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 41





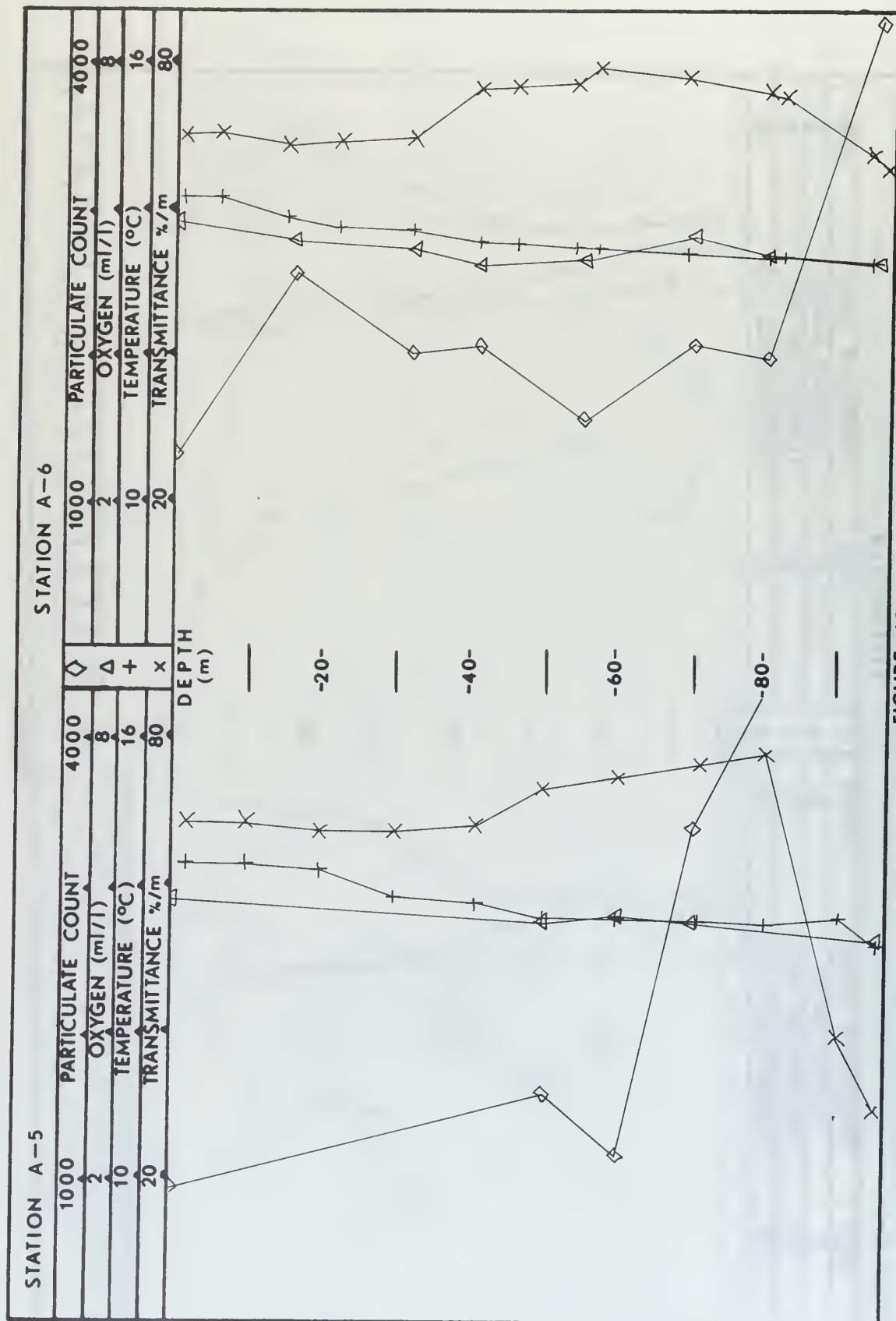
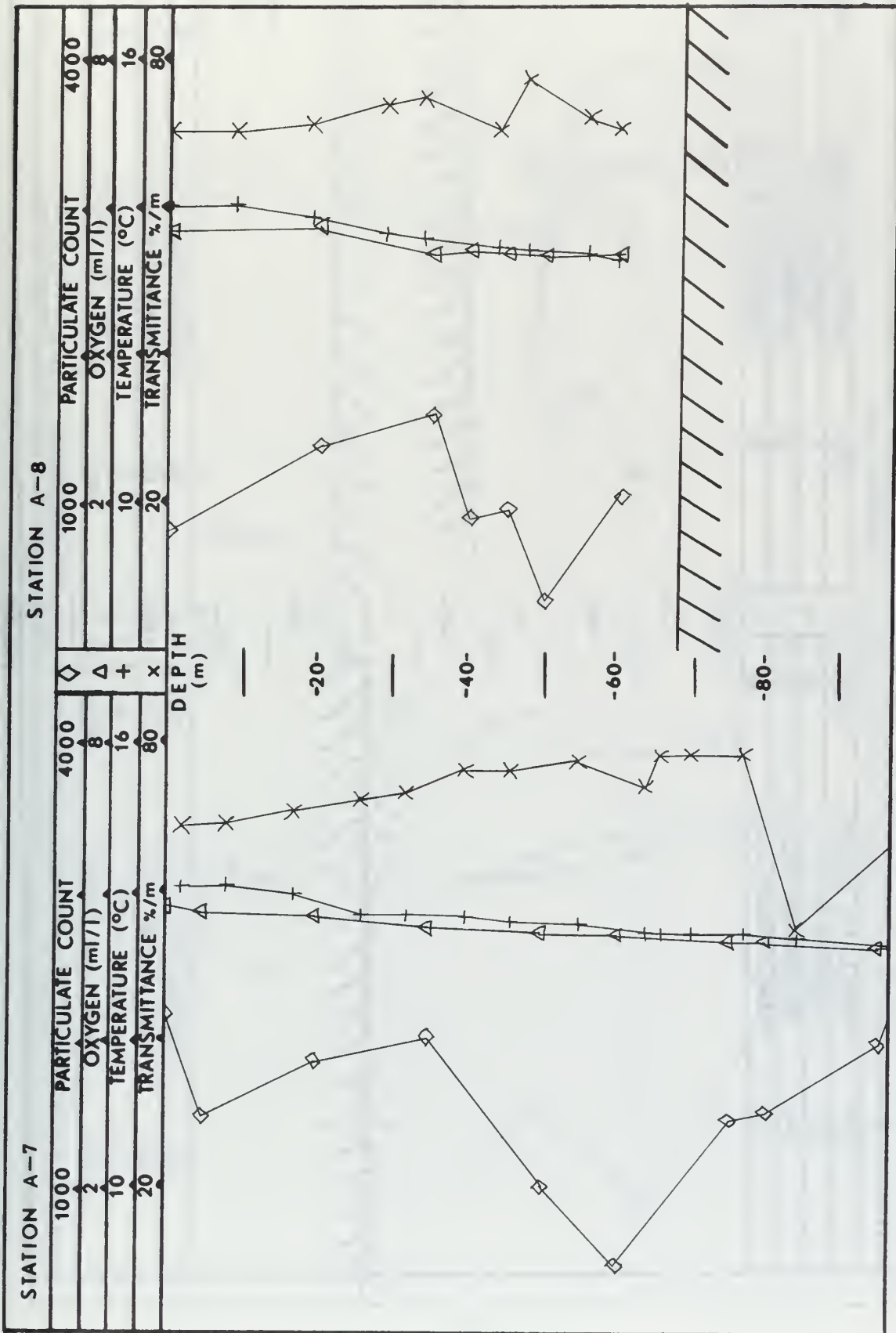


FIGURE 4.3



**FIGURE 44**

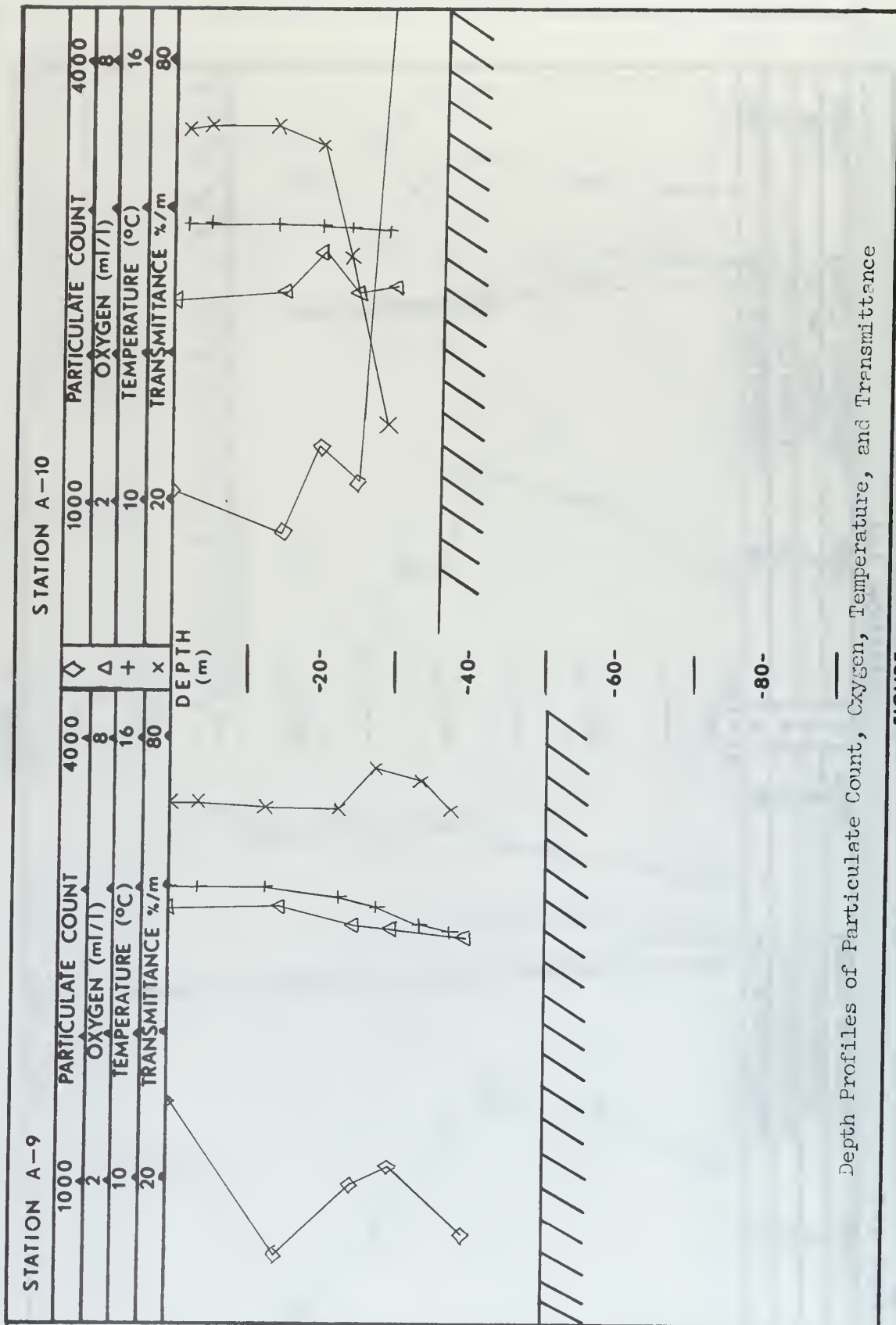
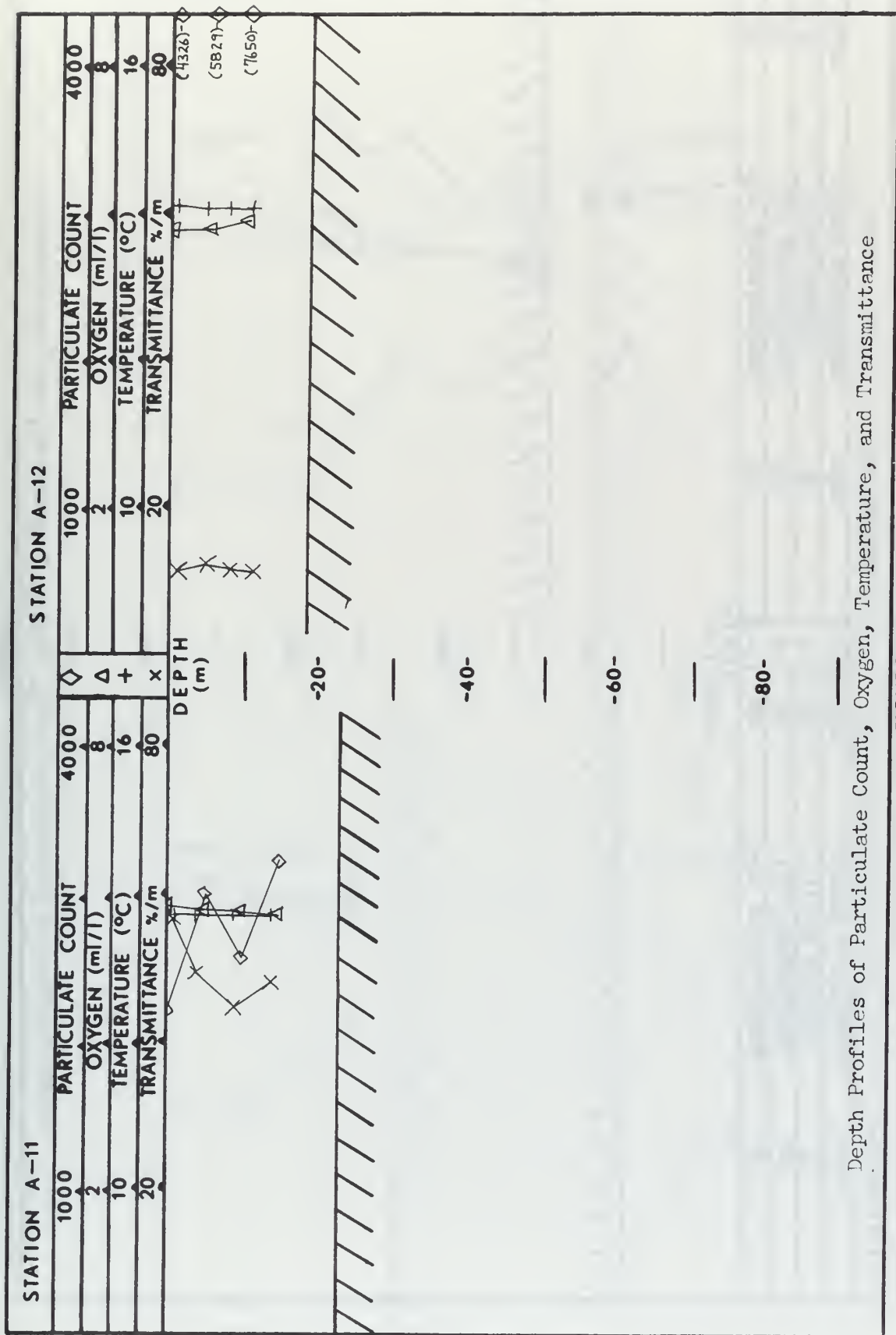


FIGURE 45



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 46



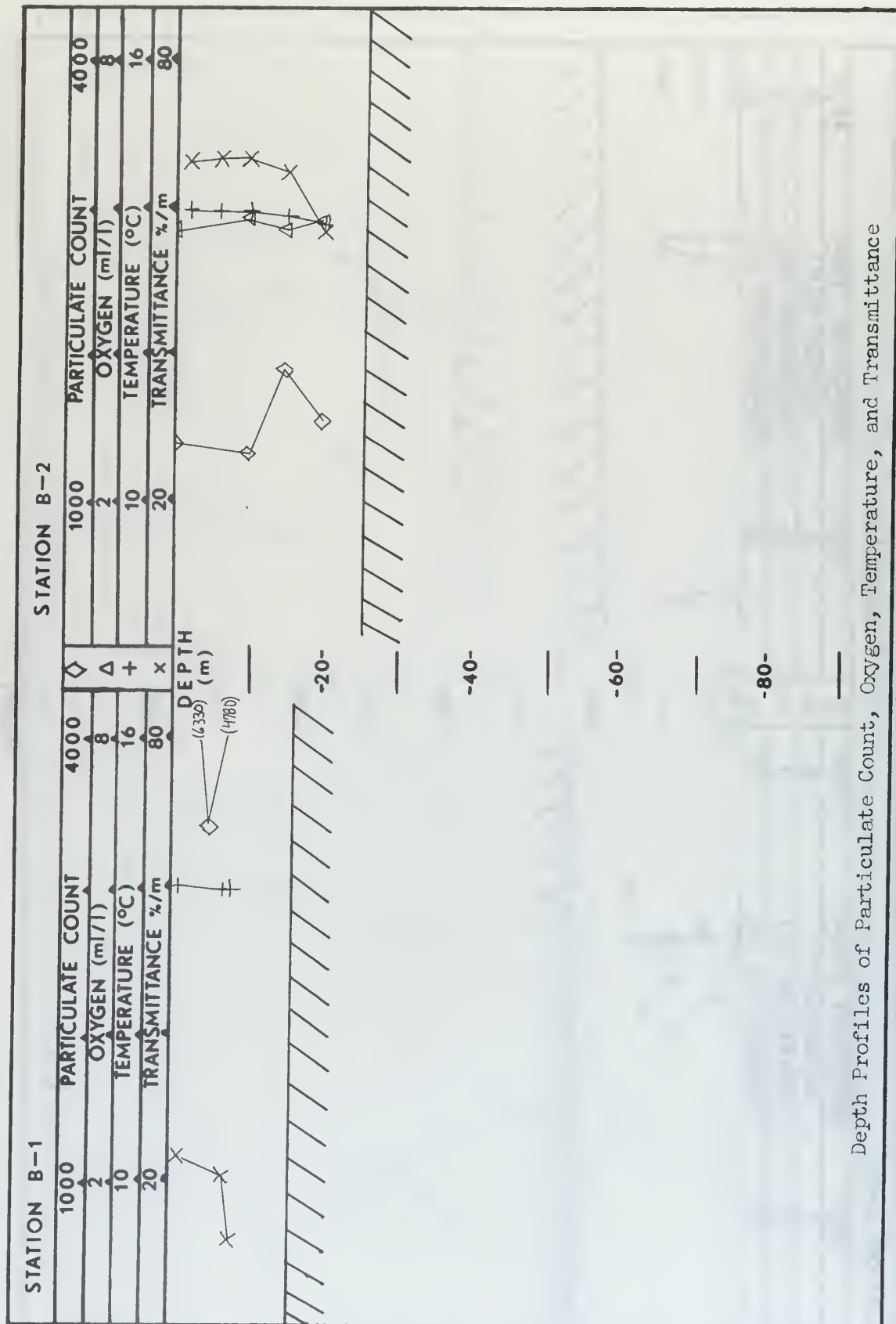
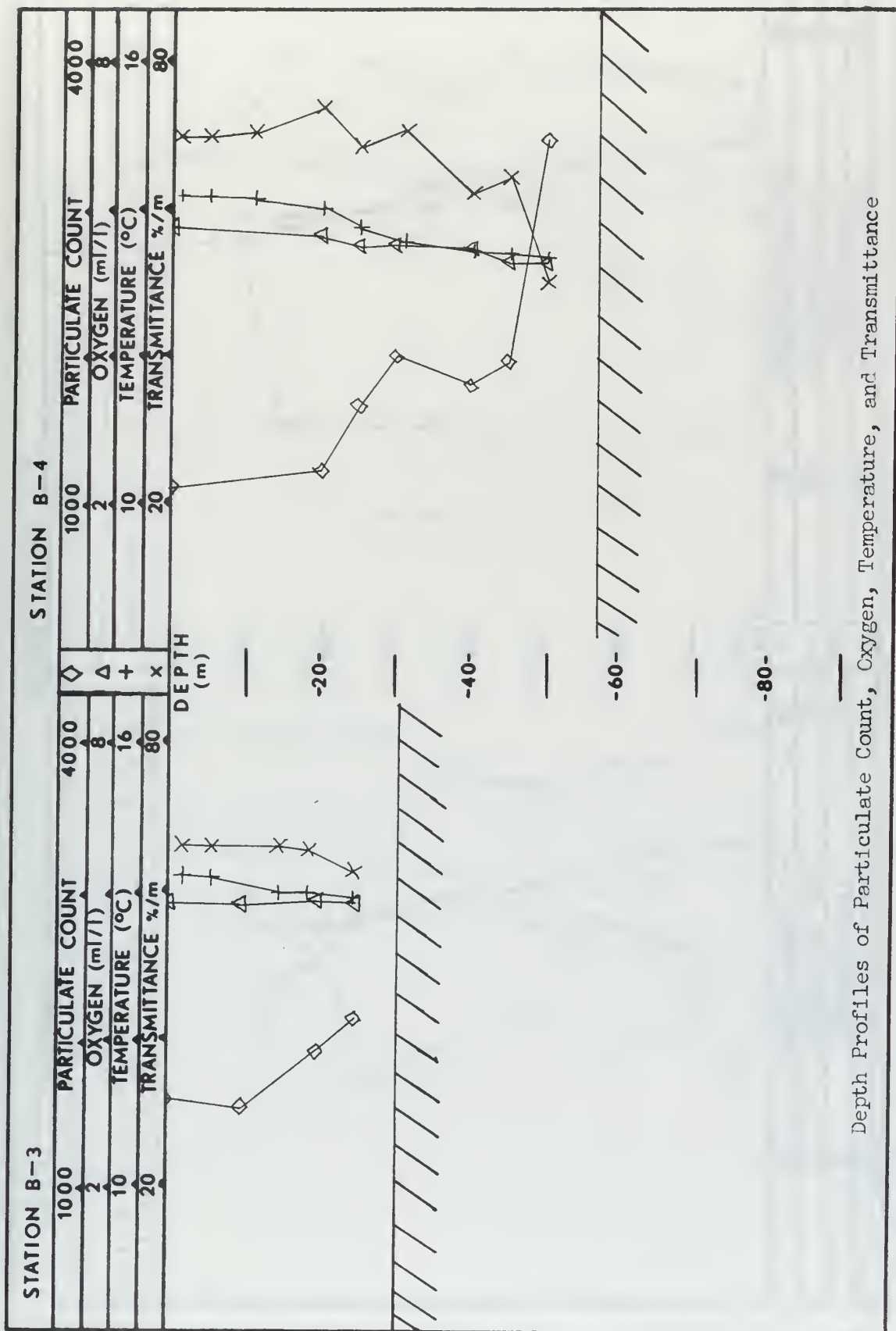


FIGURE 47



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 48

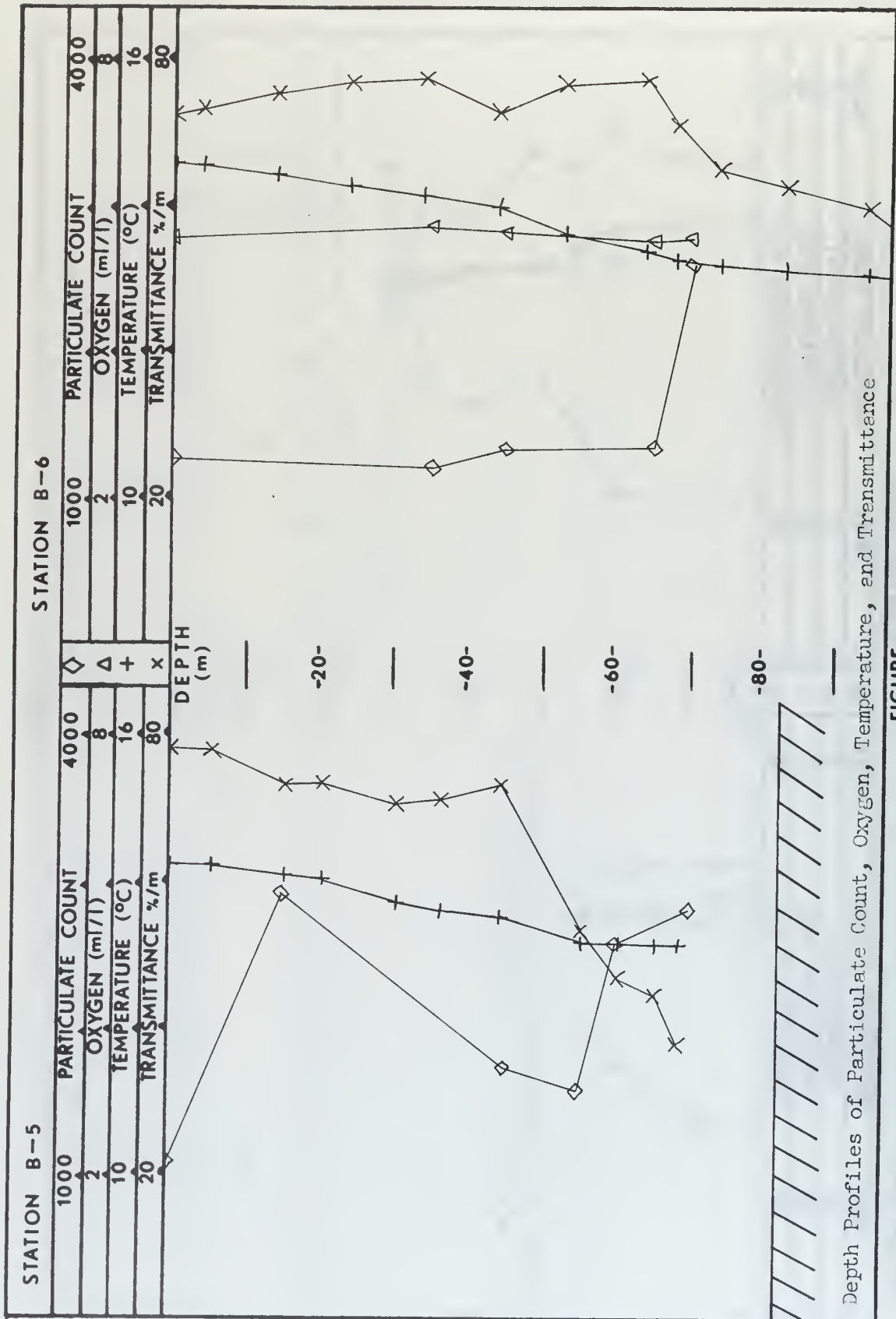
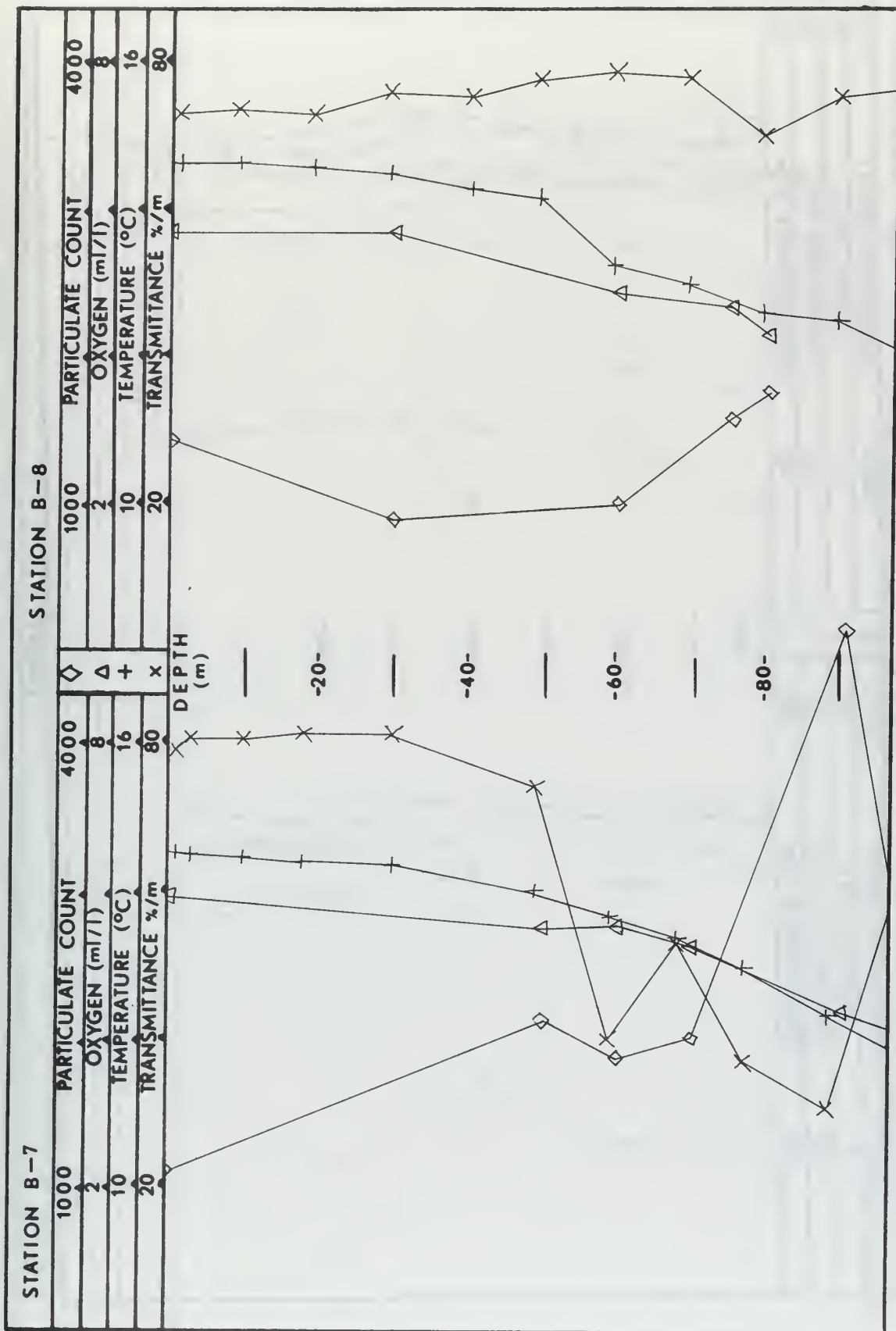


FIGURE 49



**FIGURE 50**



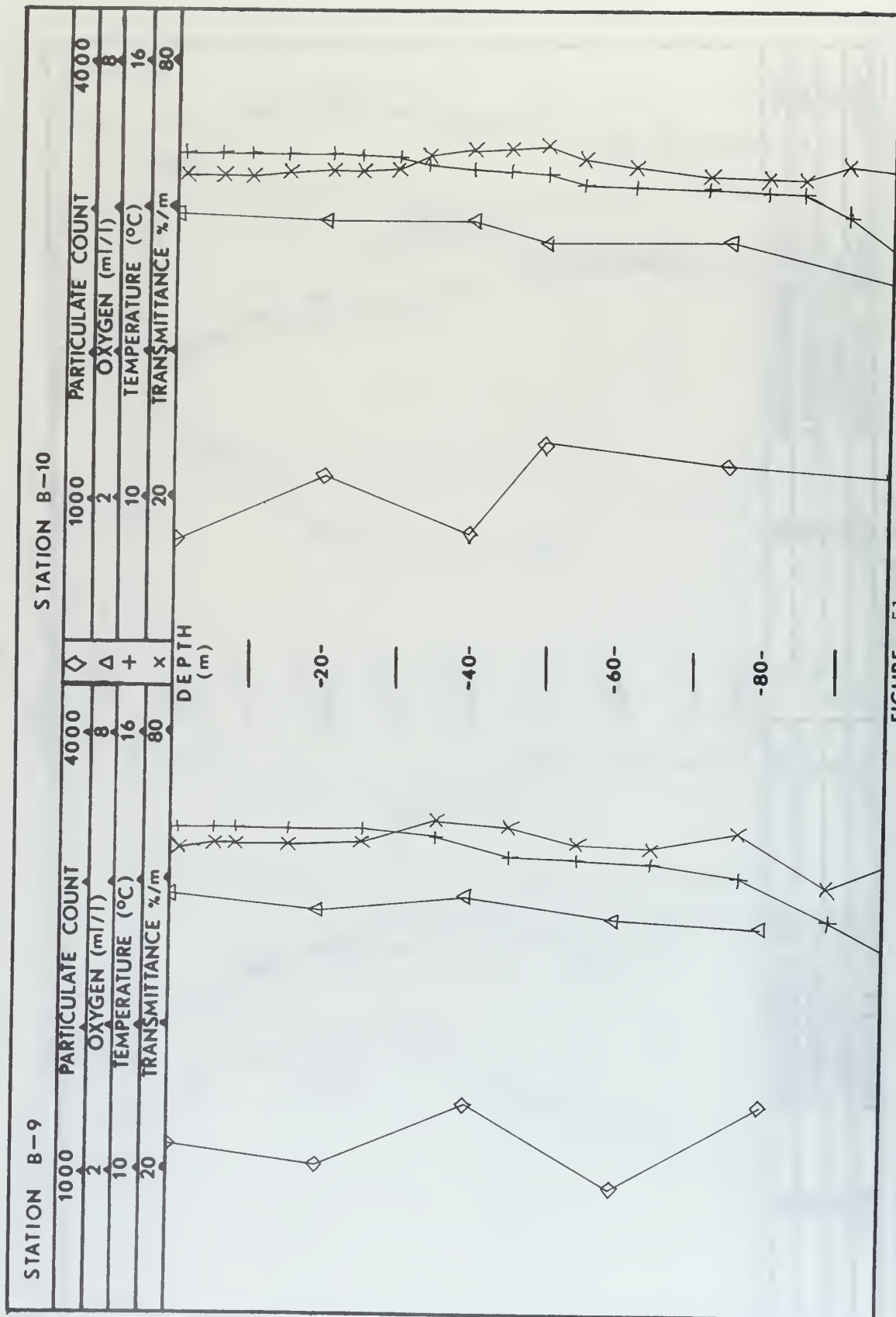
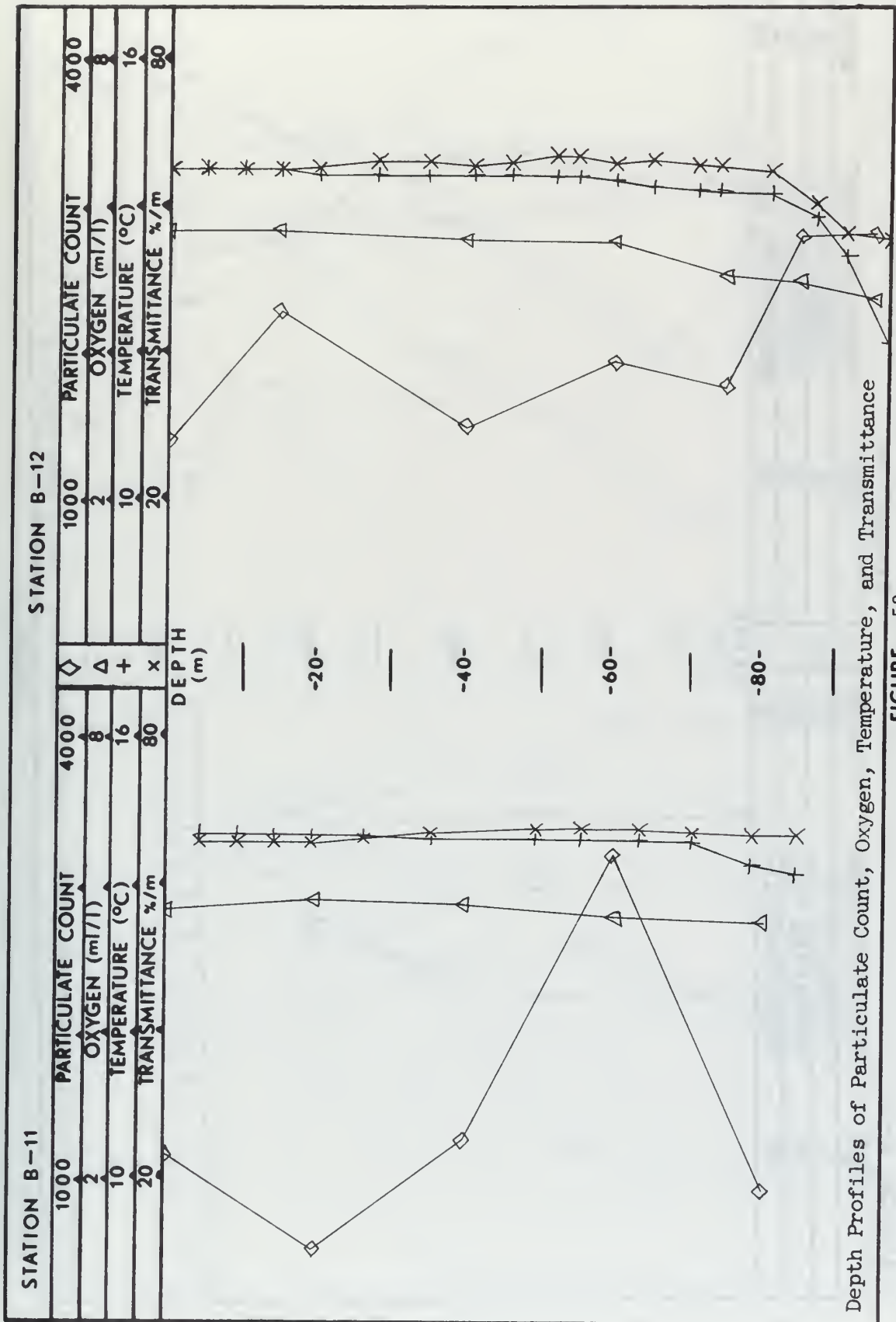
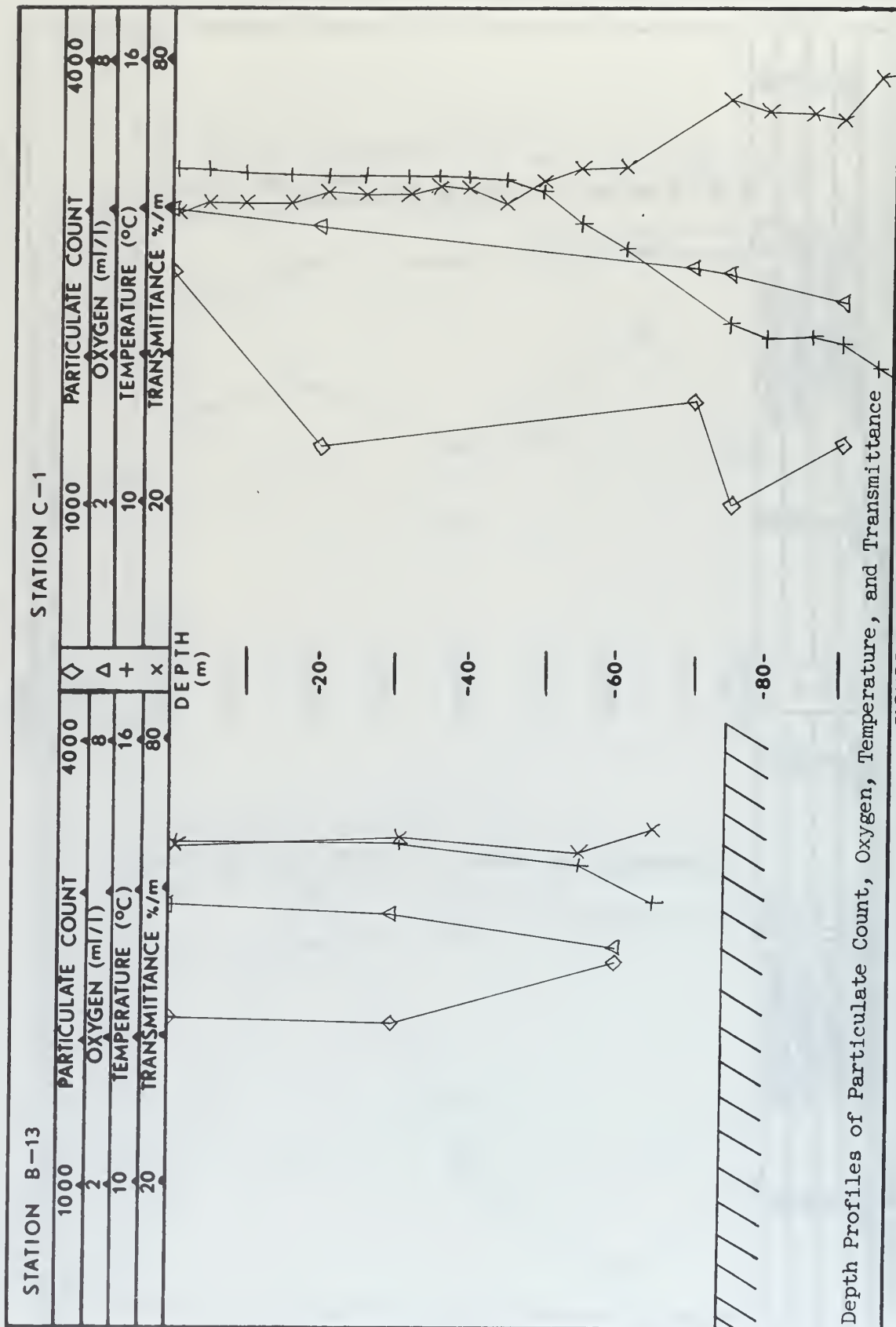


FIGURE 51



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

**FIGURE 52**



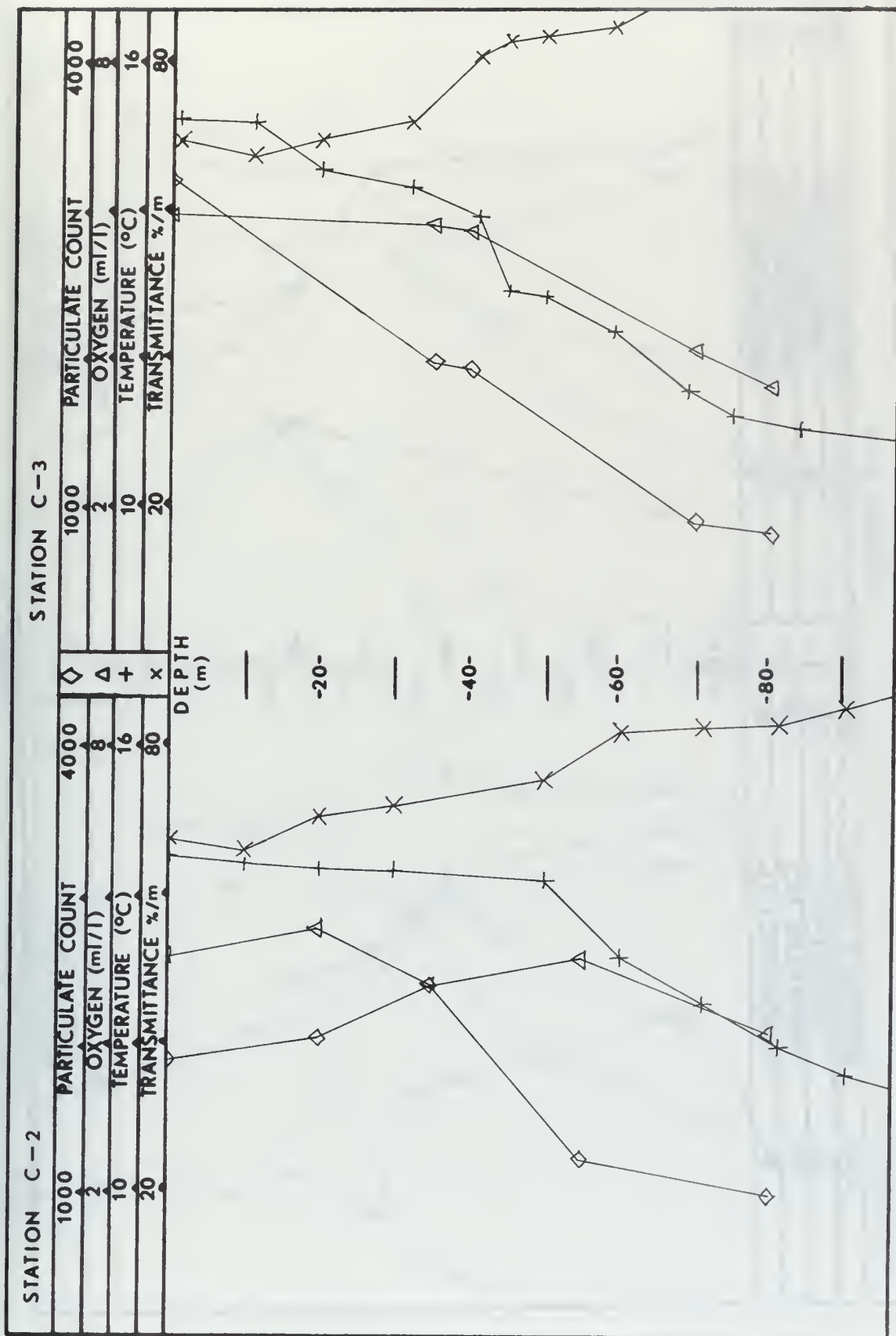


FIGURE 54



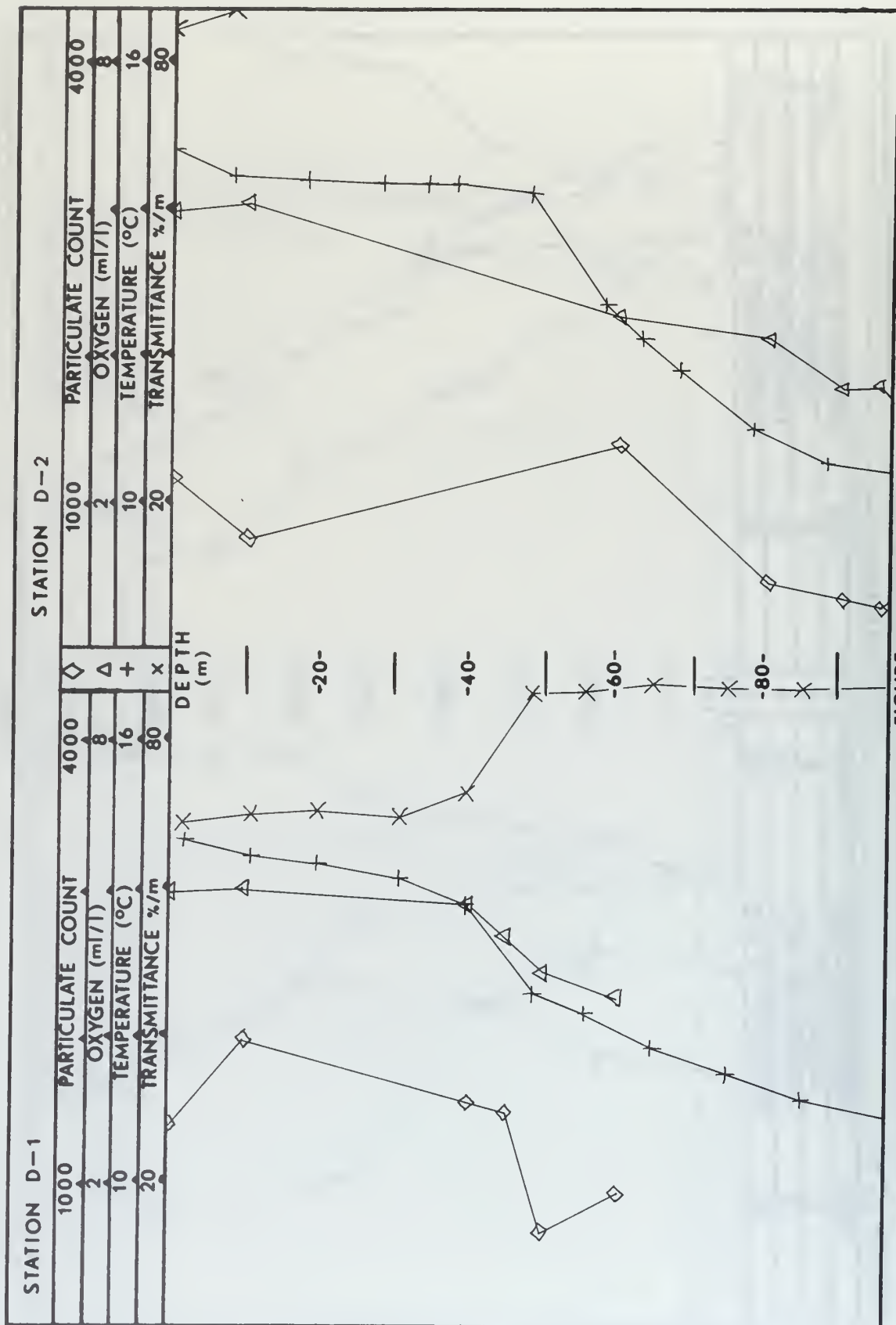


FIGURE 55

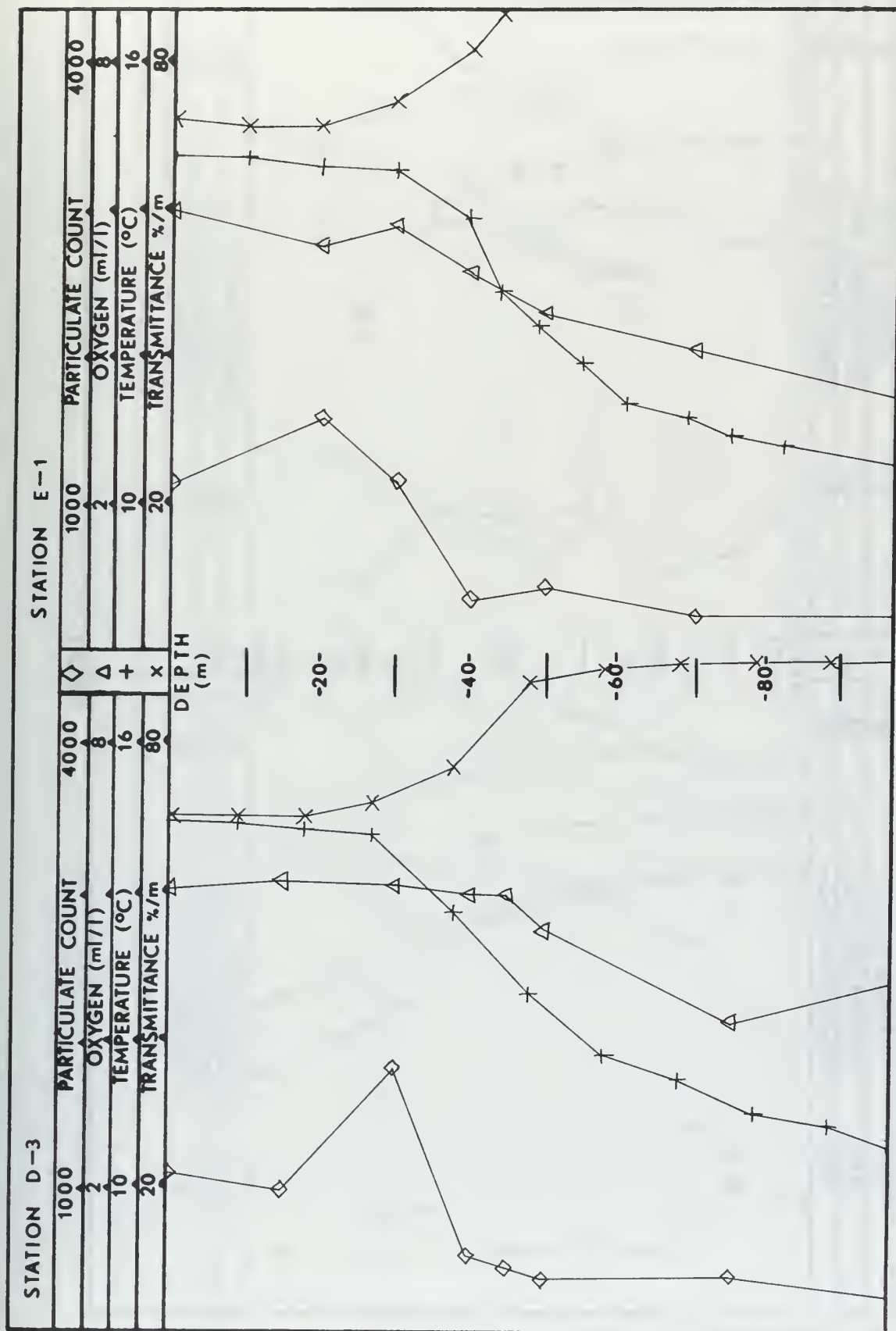


FIGURE 56

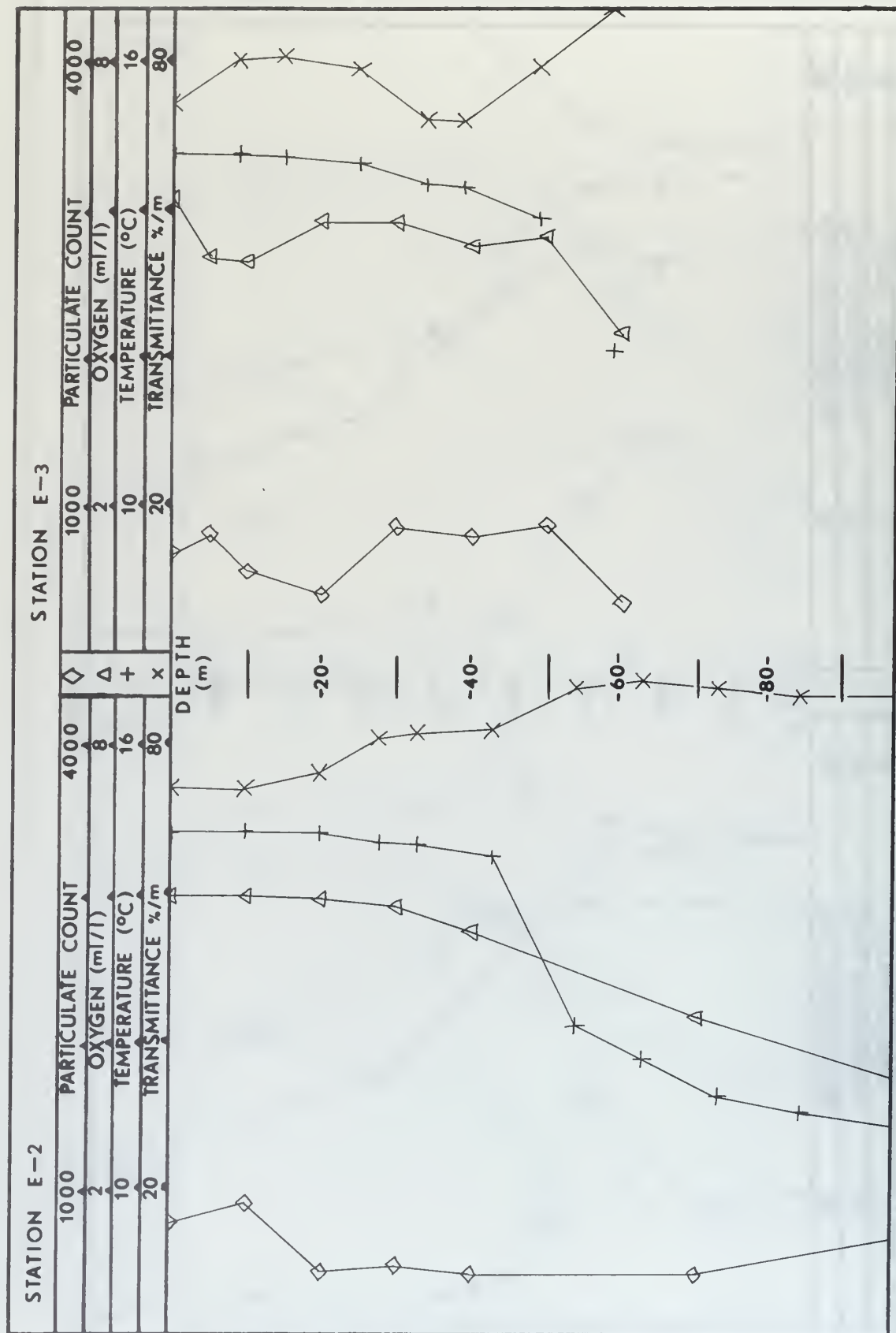


FIGURE 57

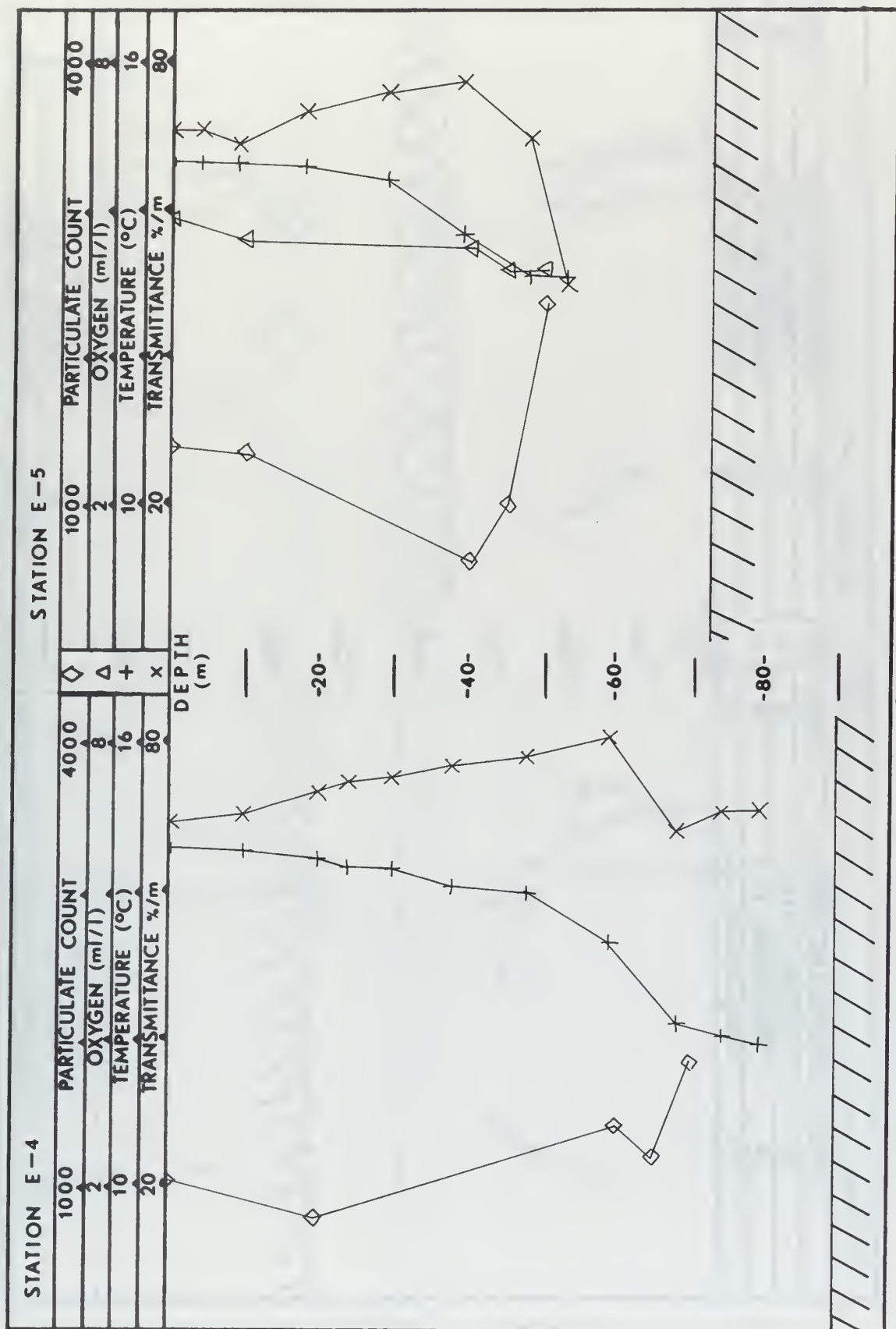
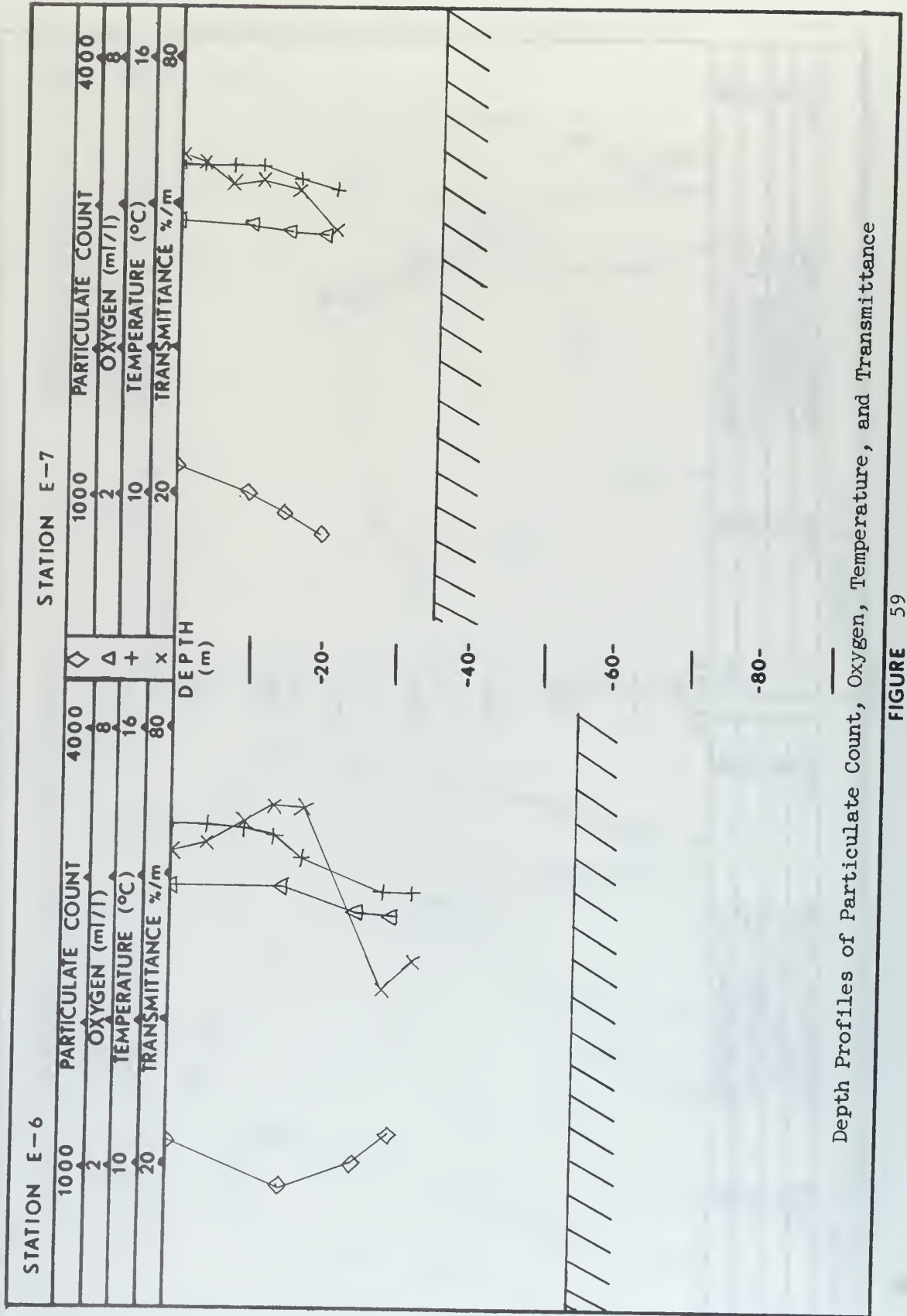
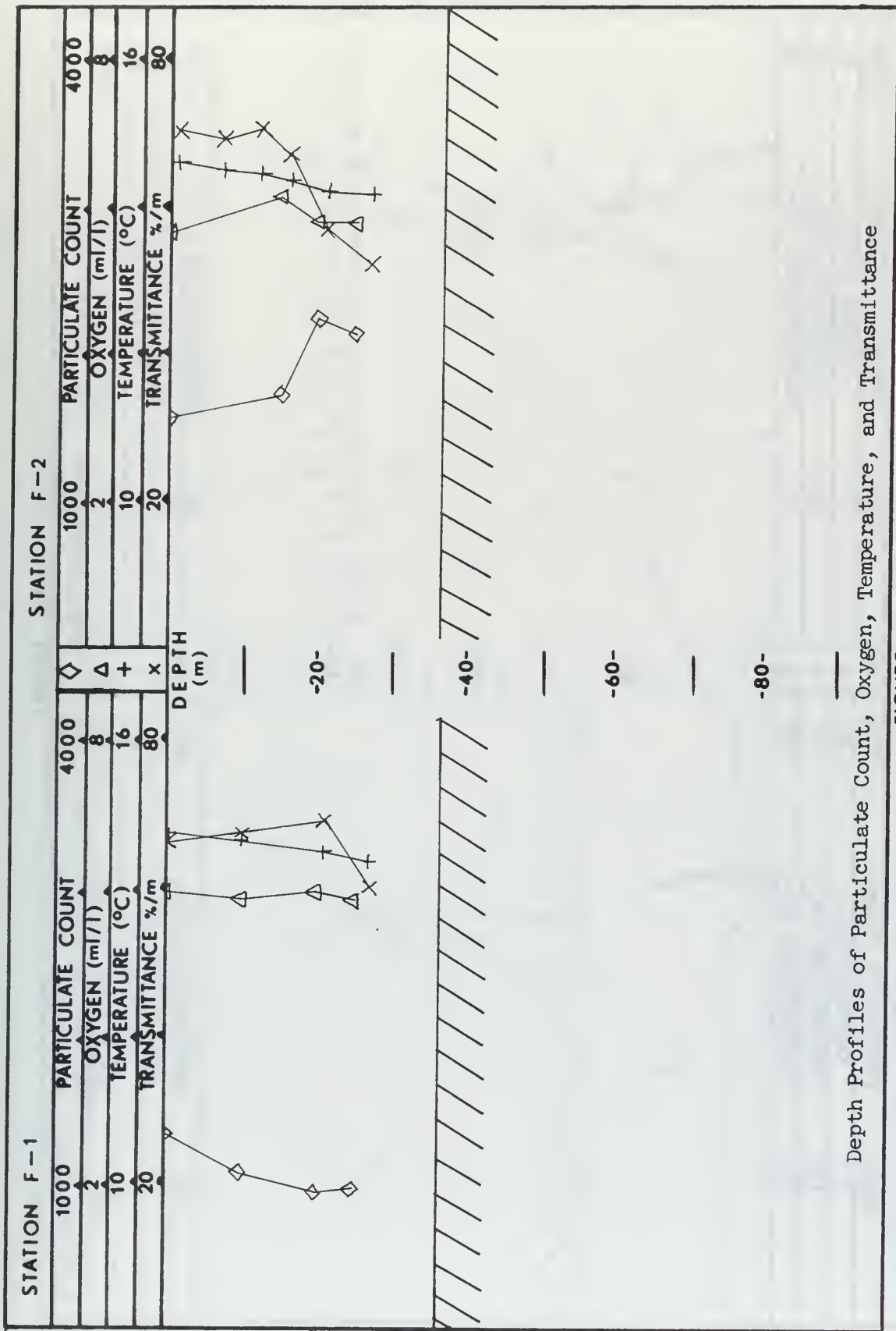


FIGURE 58



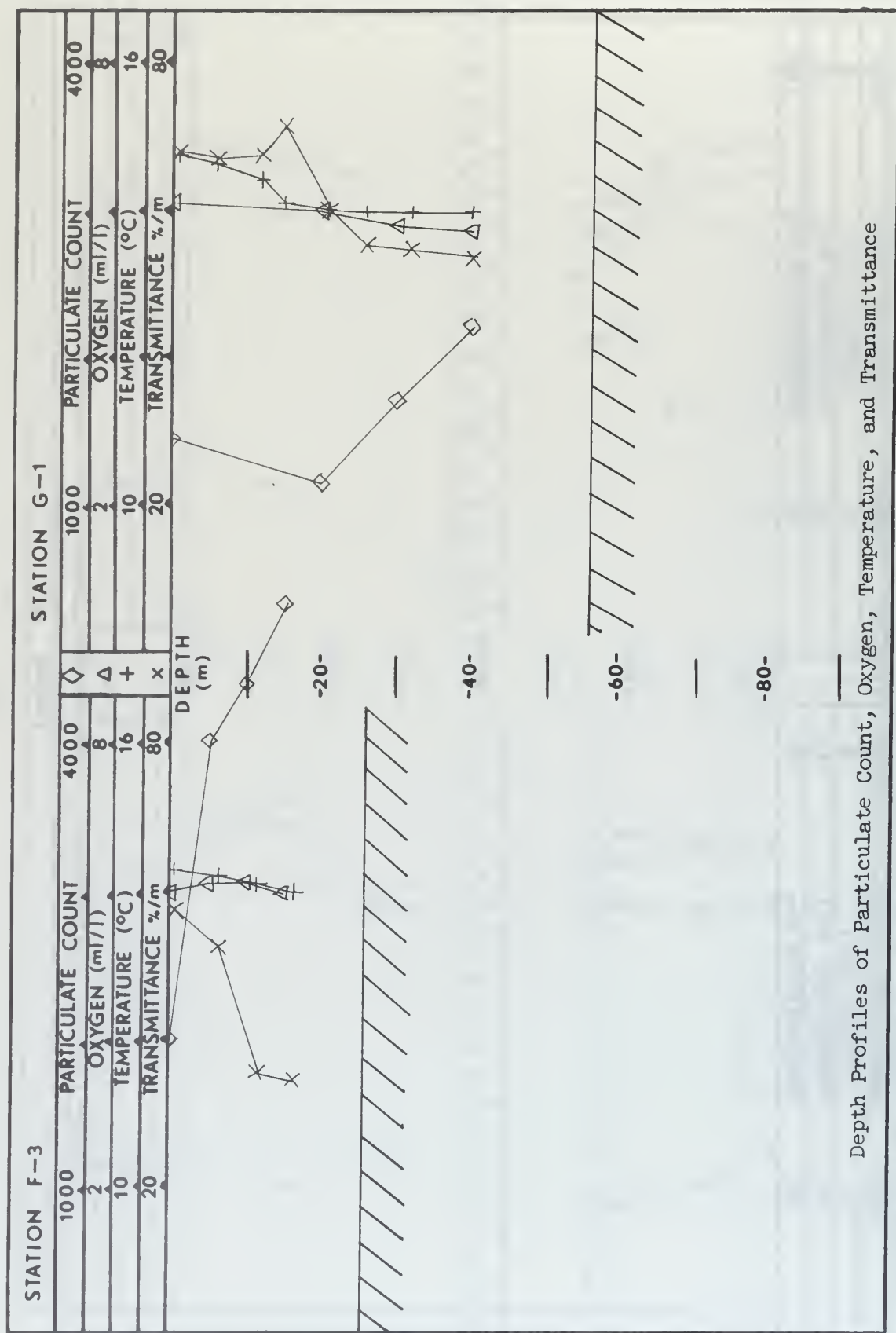


Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance



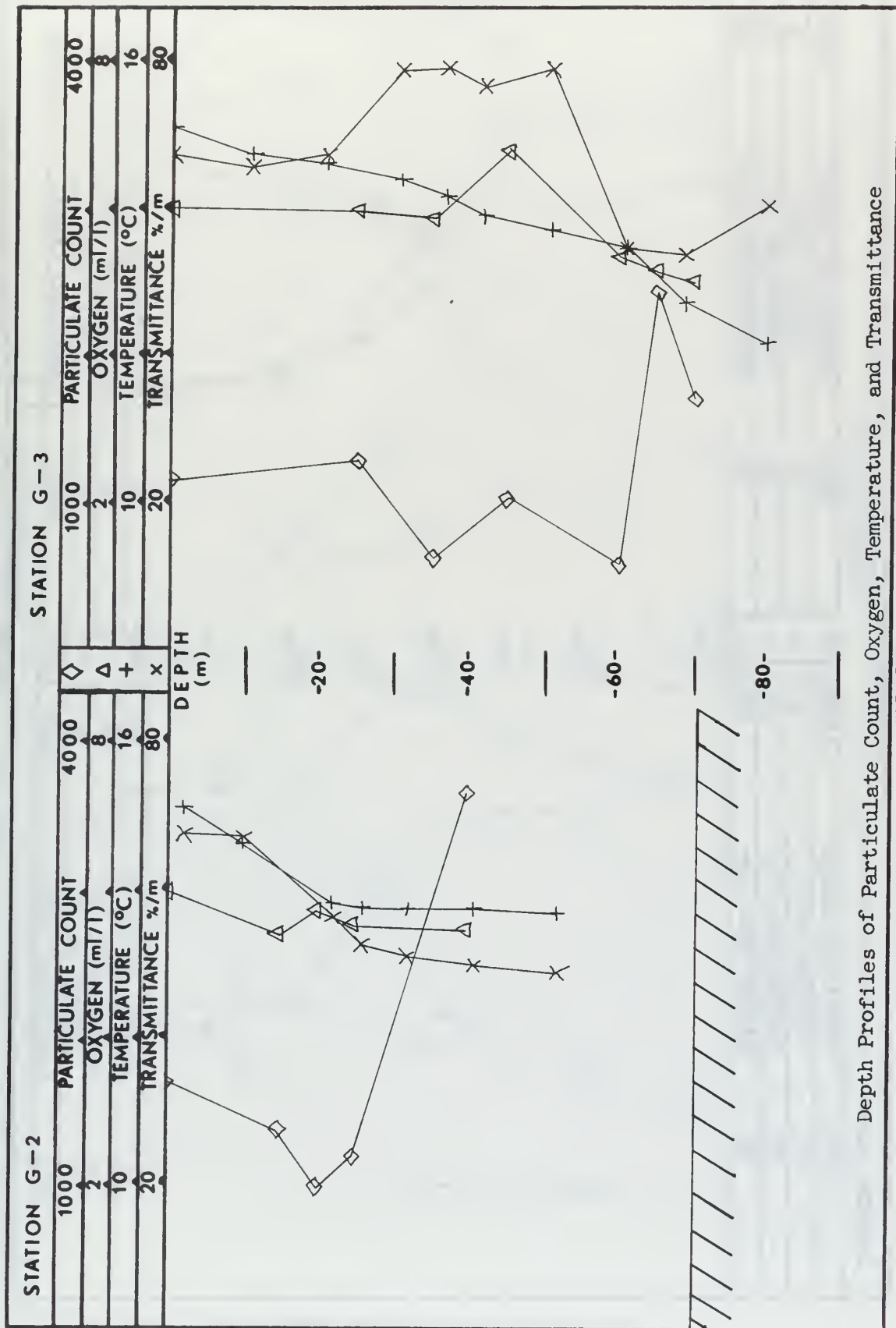
Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 60



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 61



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 62



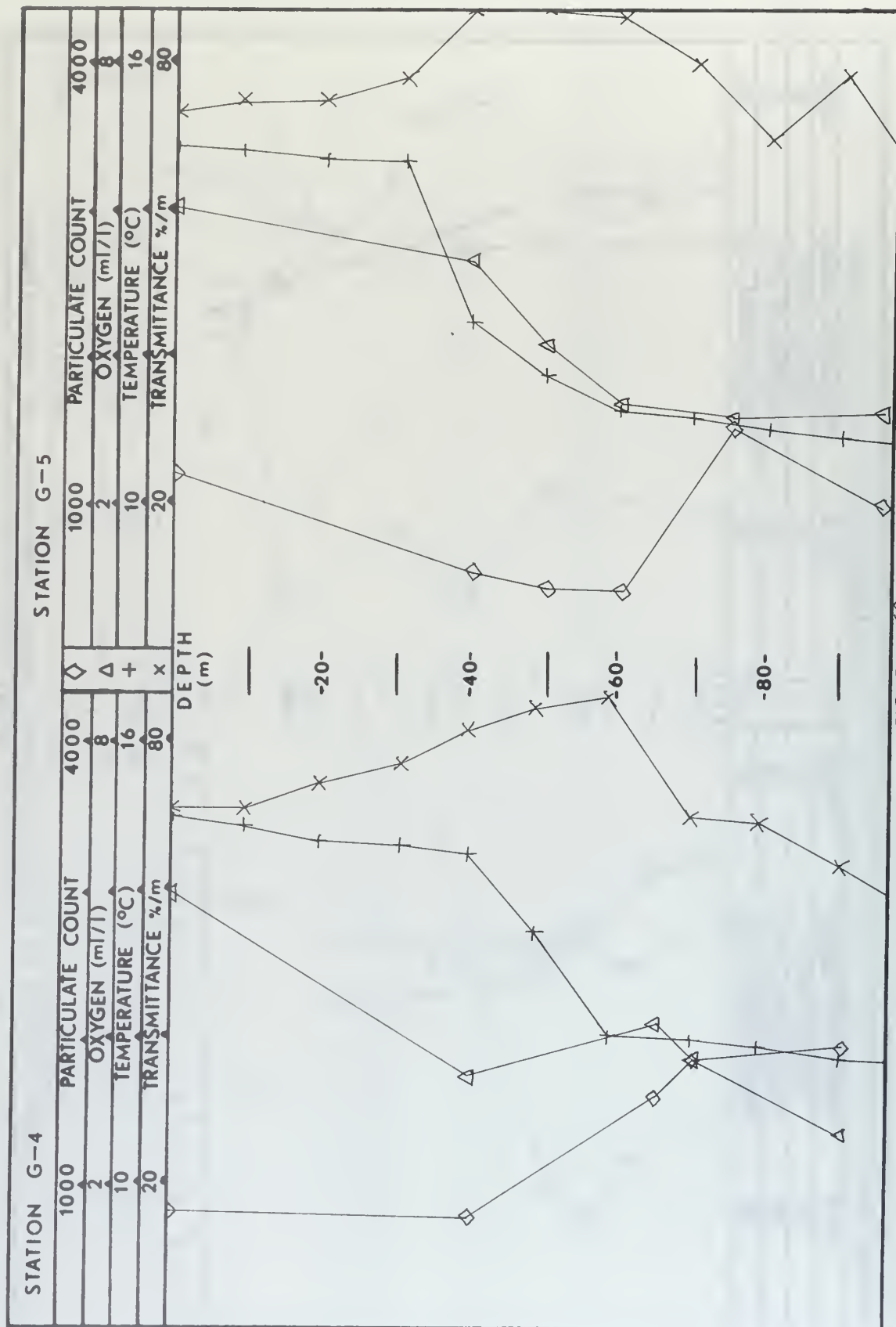


FIGURE 63

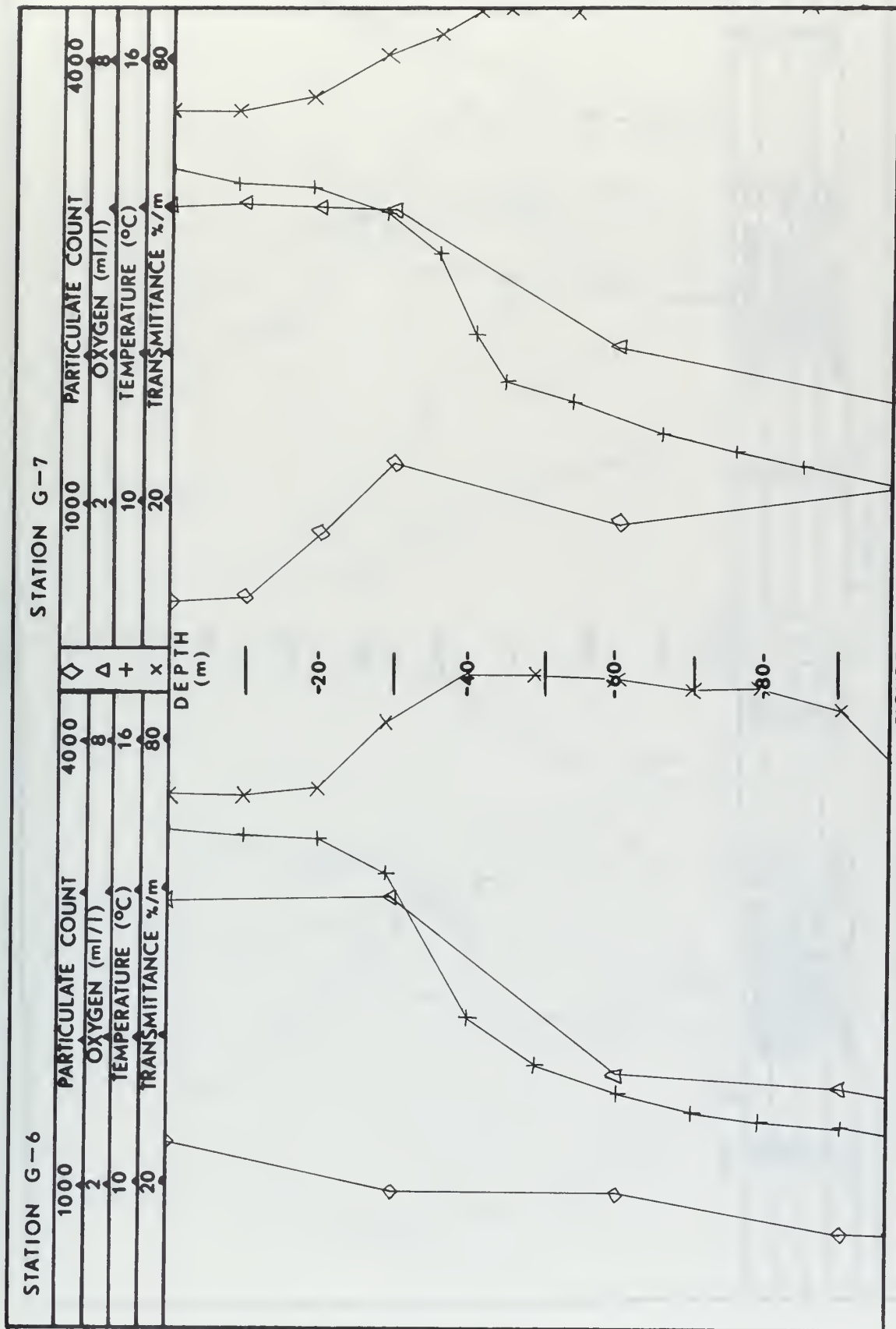


FIGURE 64

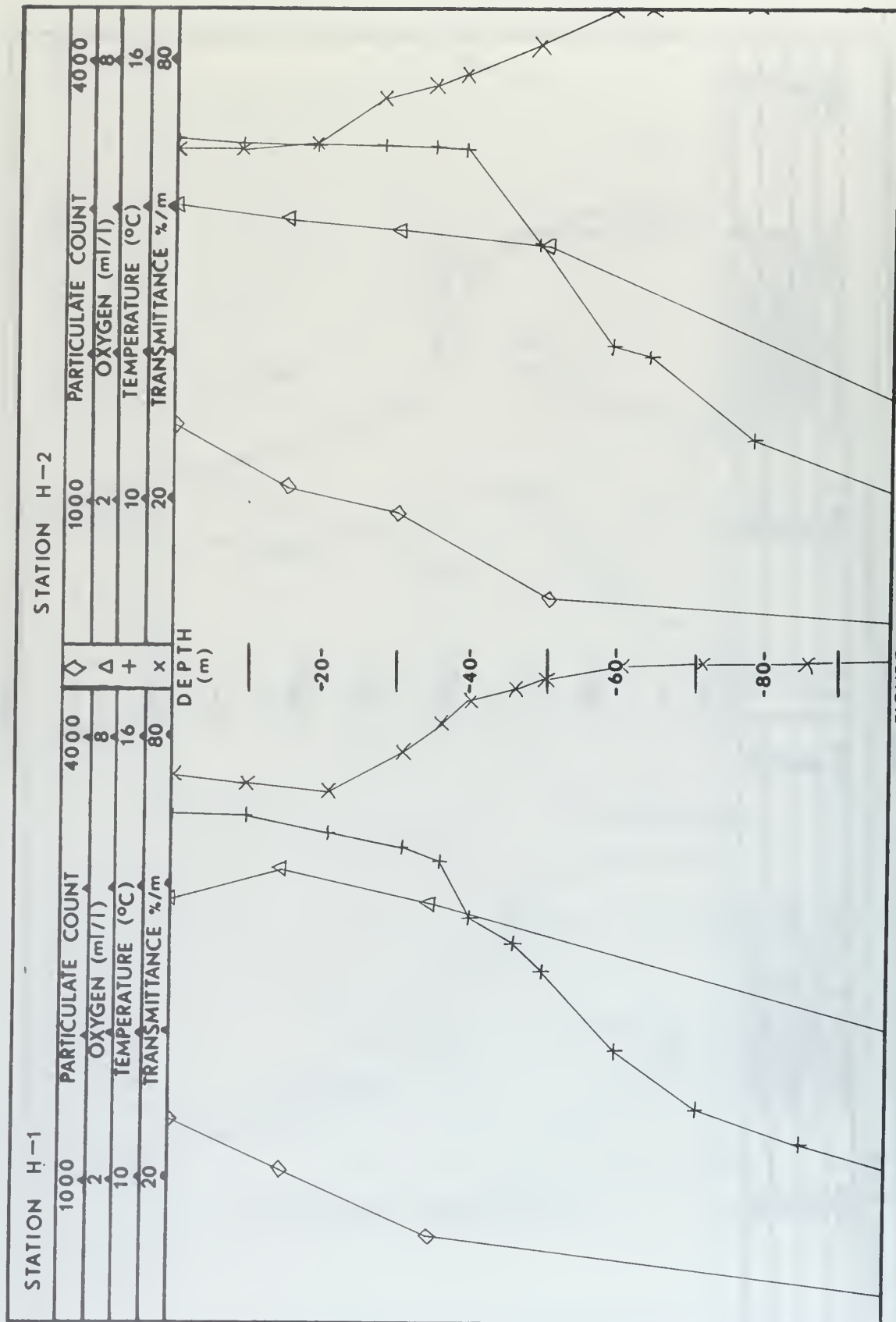
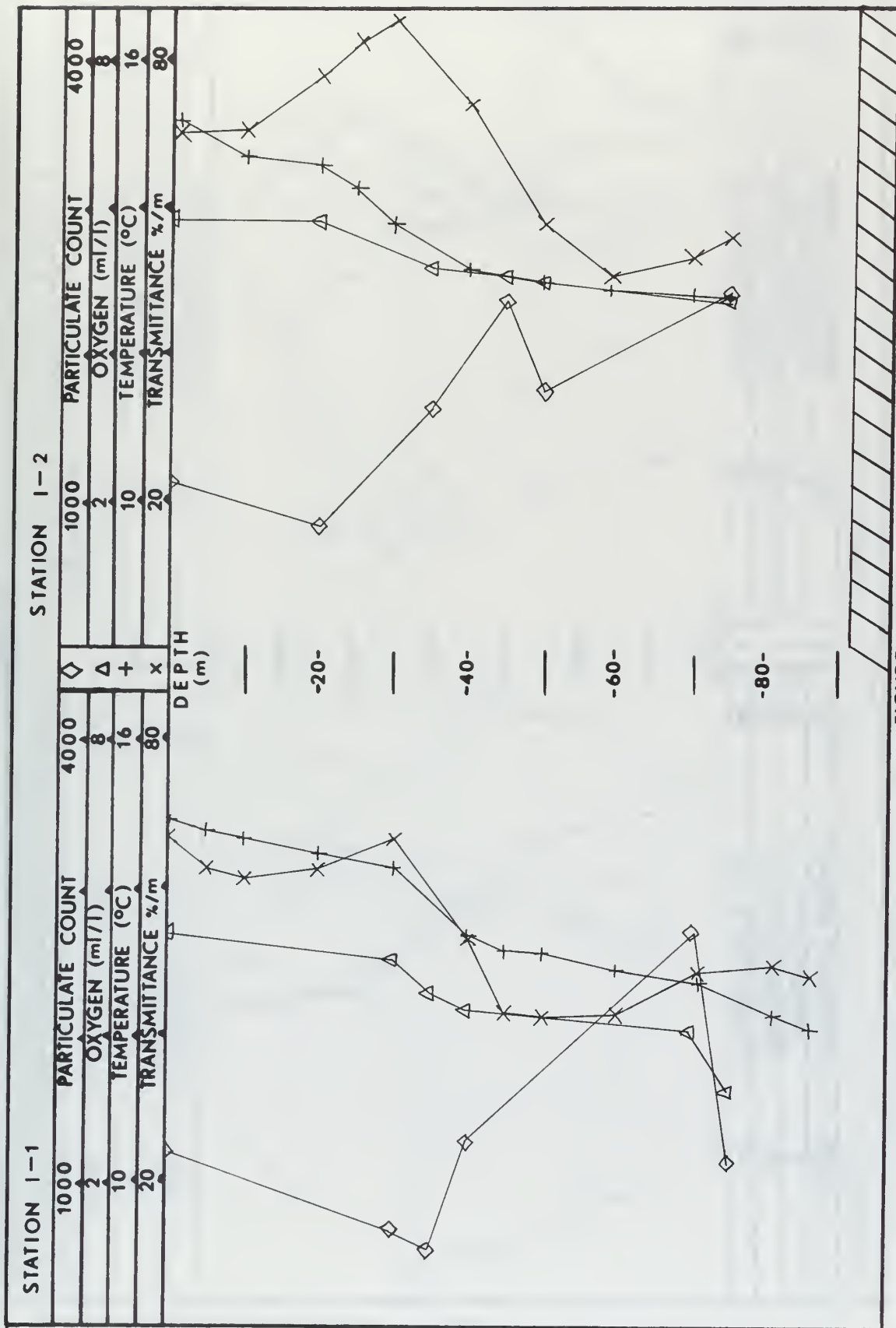


FIGURE 65





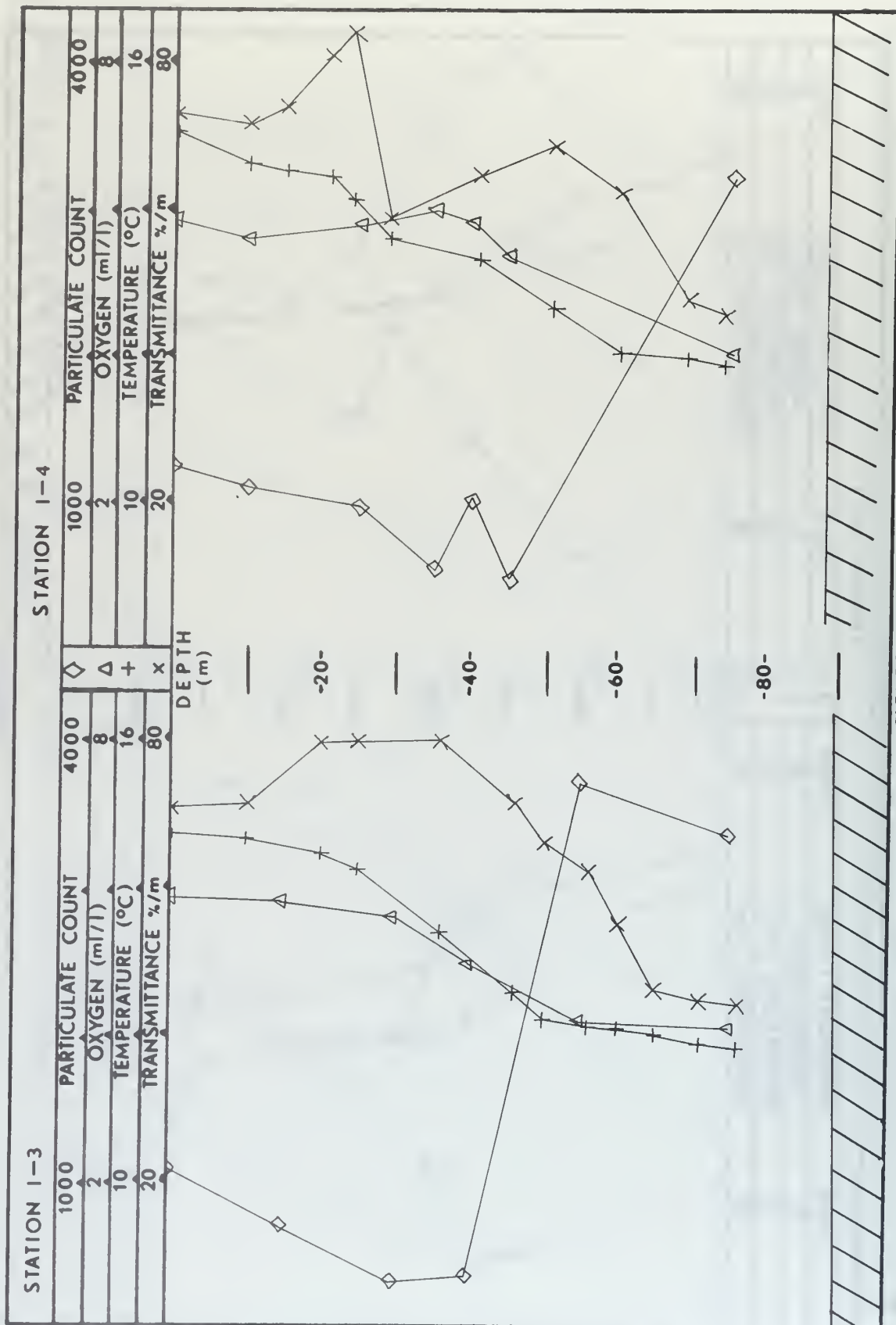


FIGURE 67

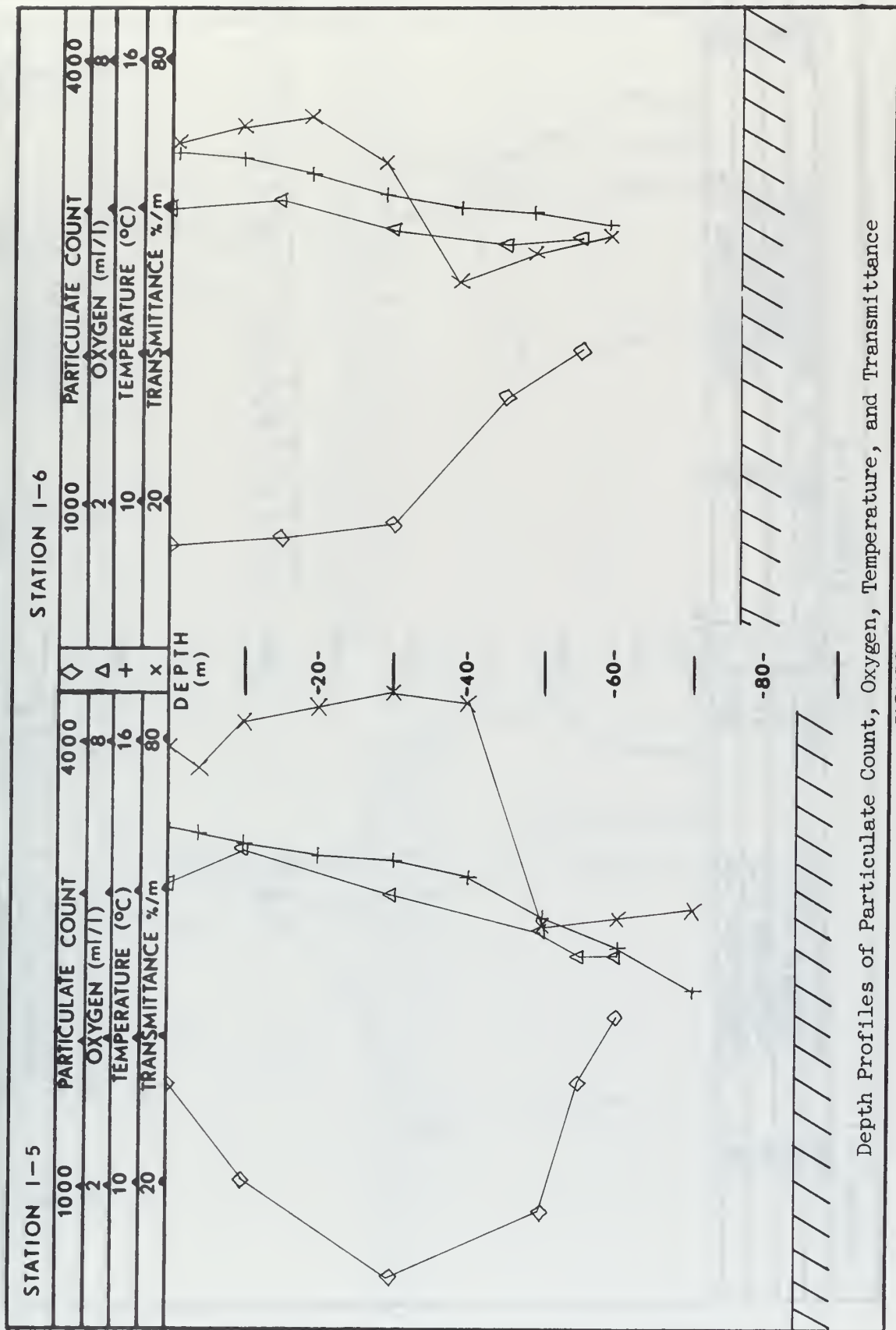


FIGURE 68

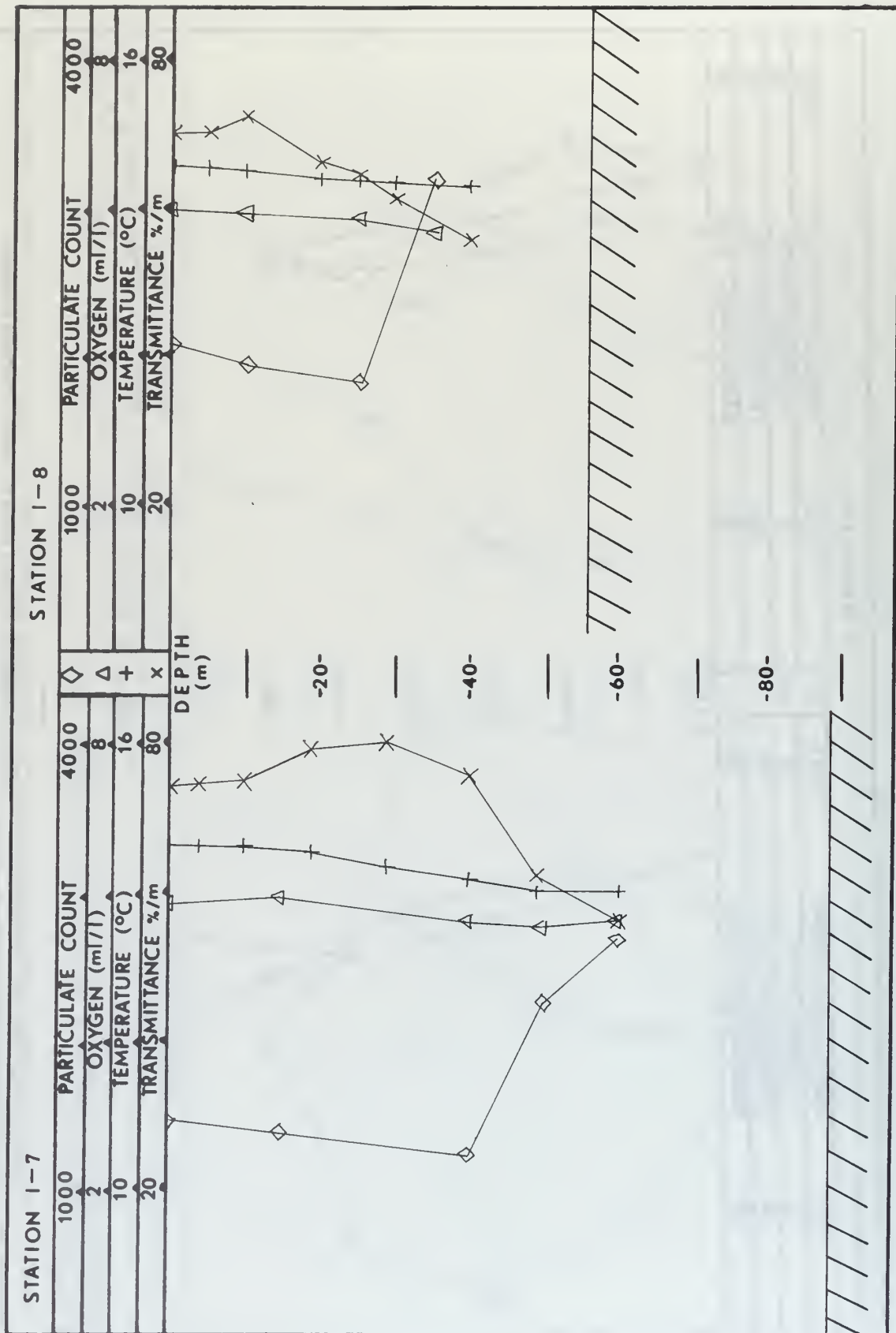
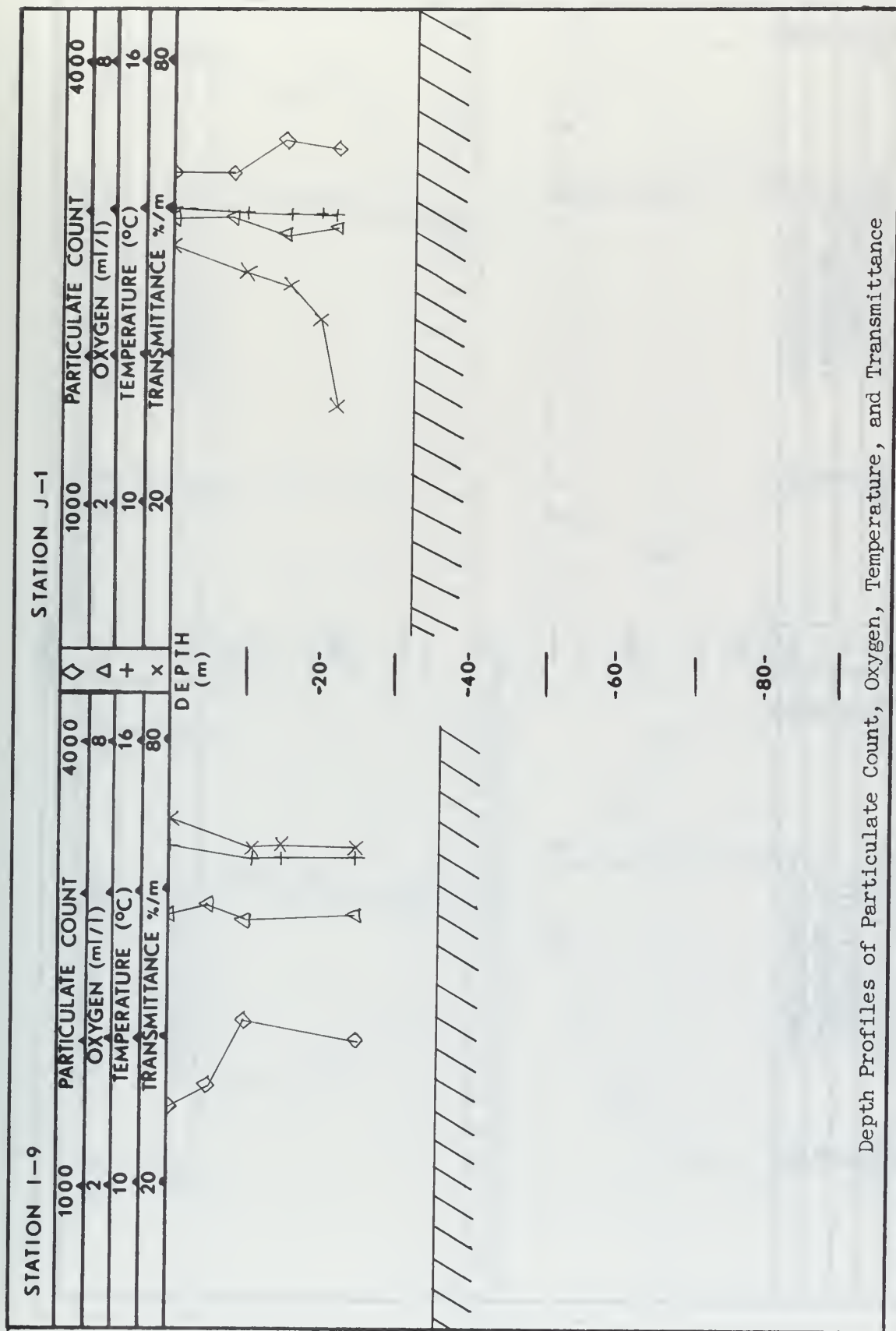


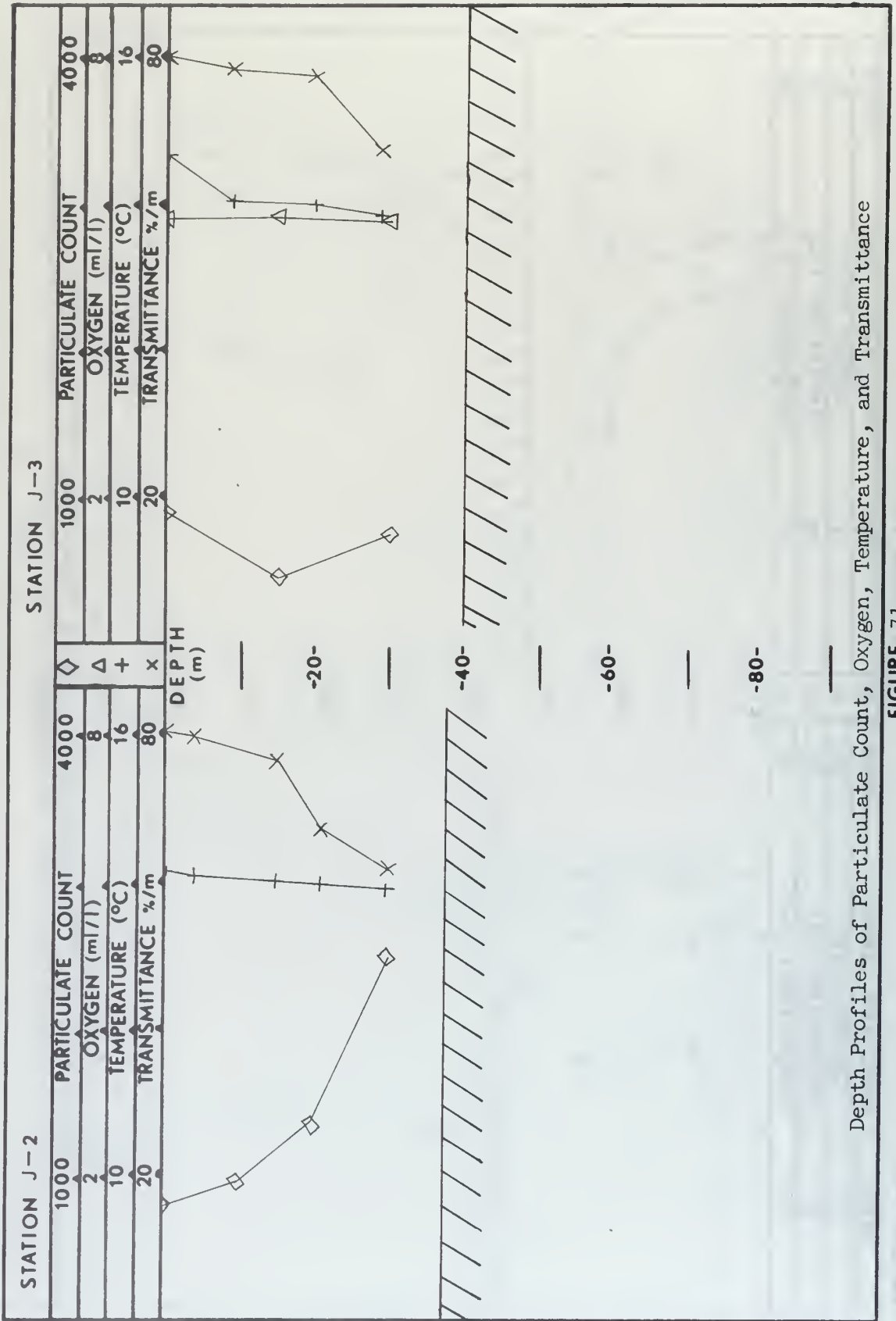
FIGURE 69



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

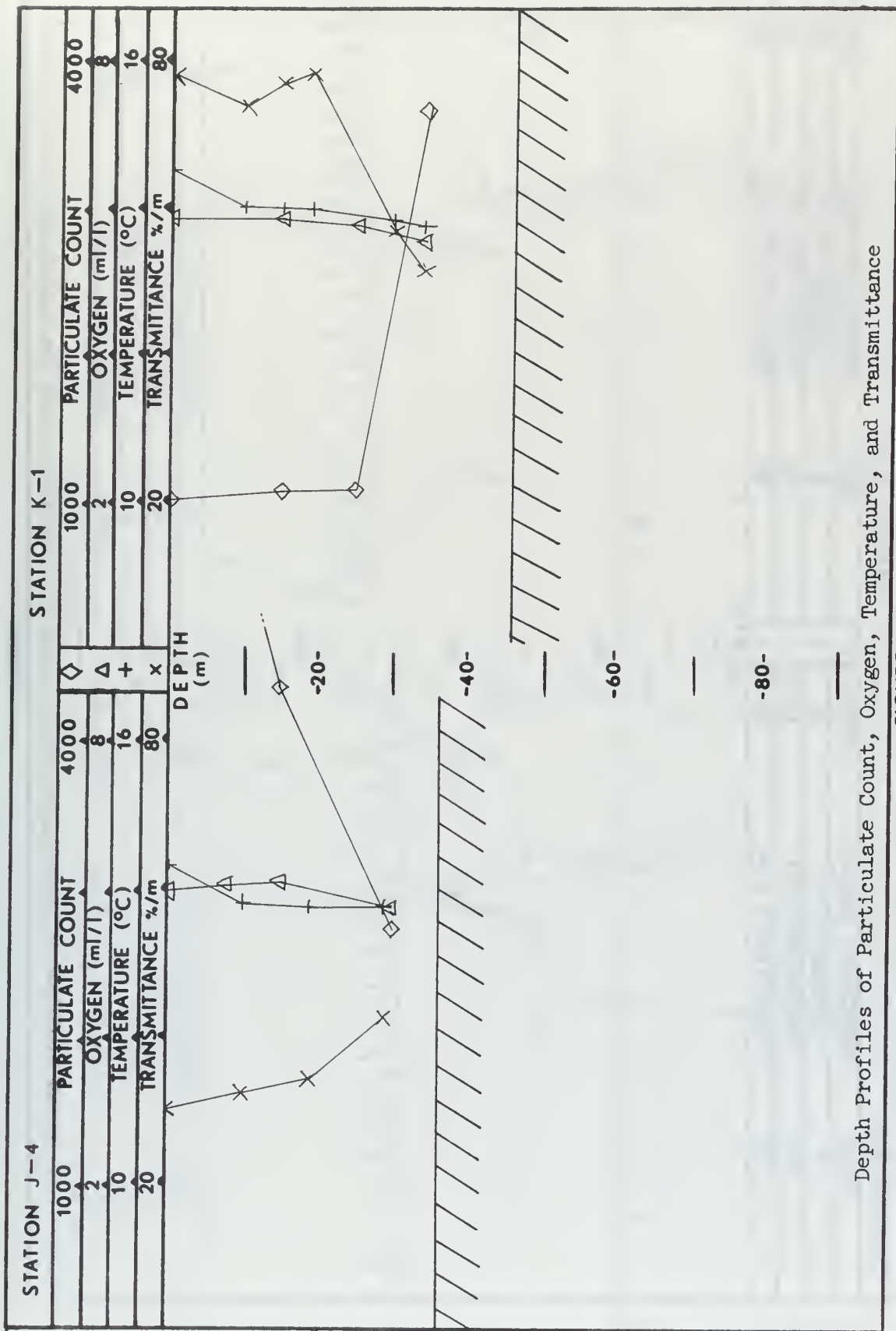
FIGURE 70





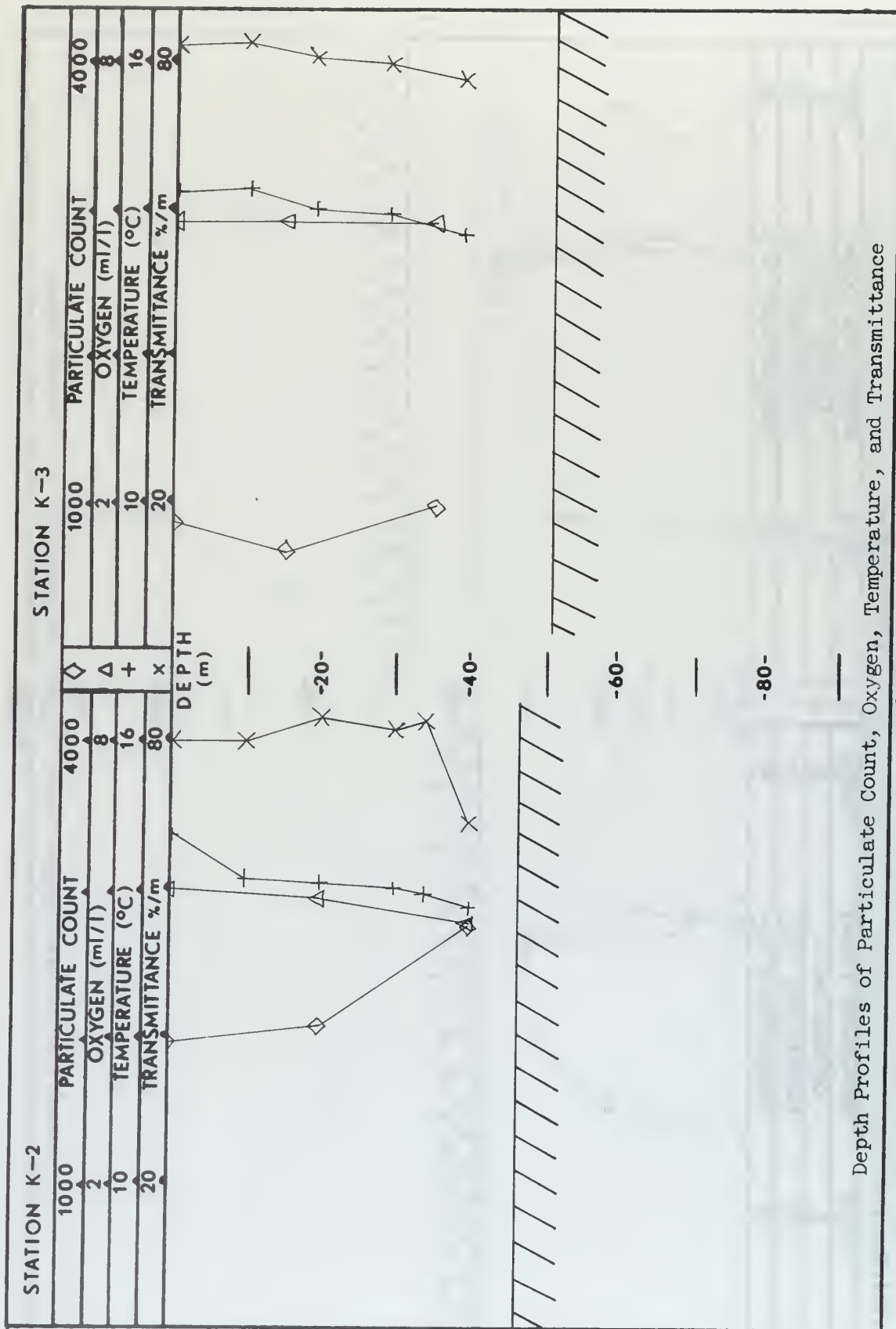
Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 71



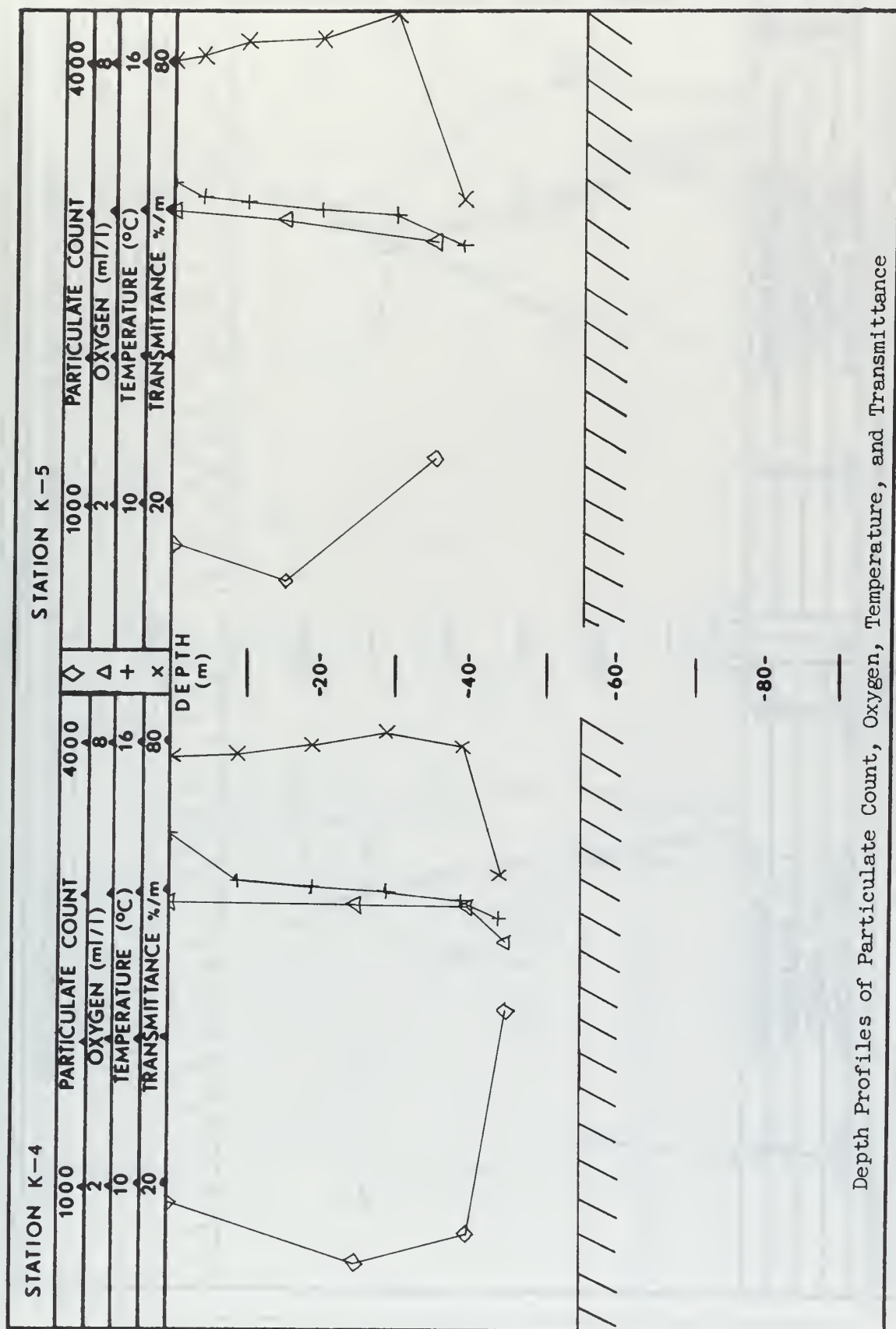
Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 72



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

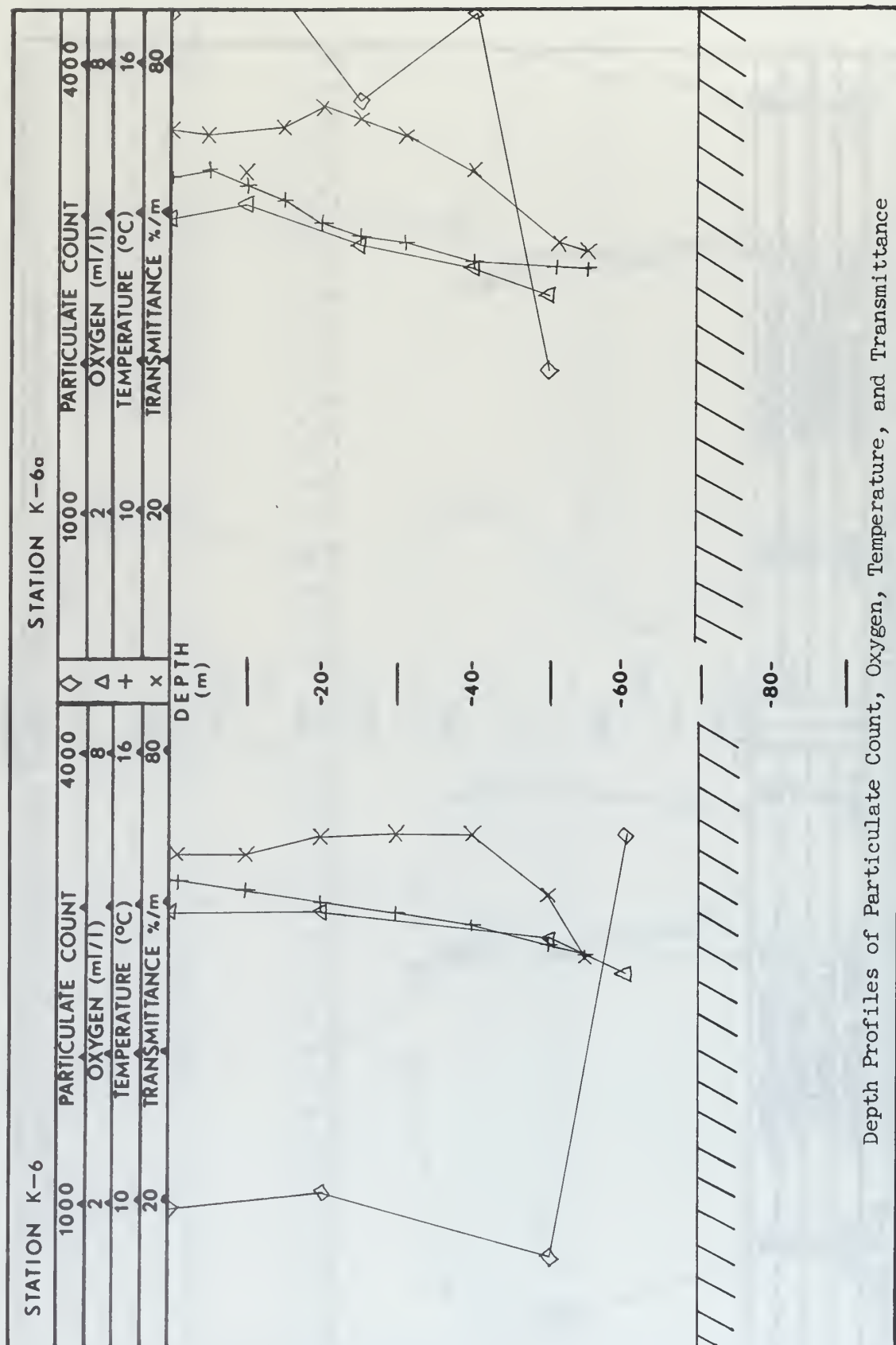
FIGURE 73



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

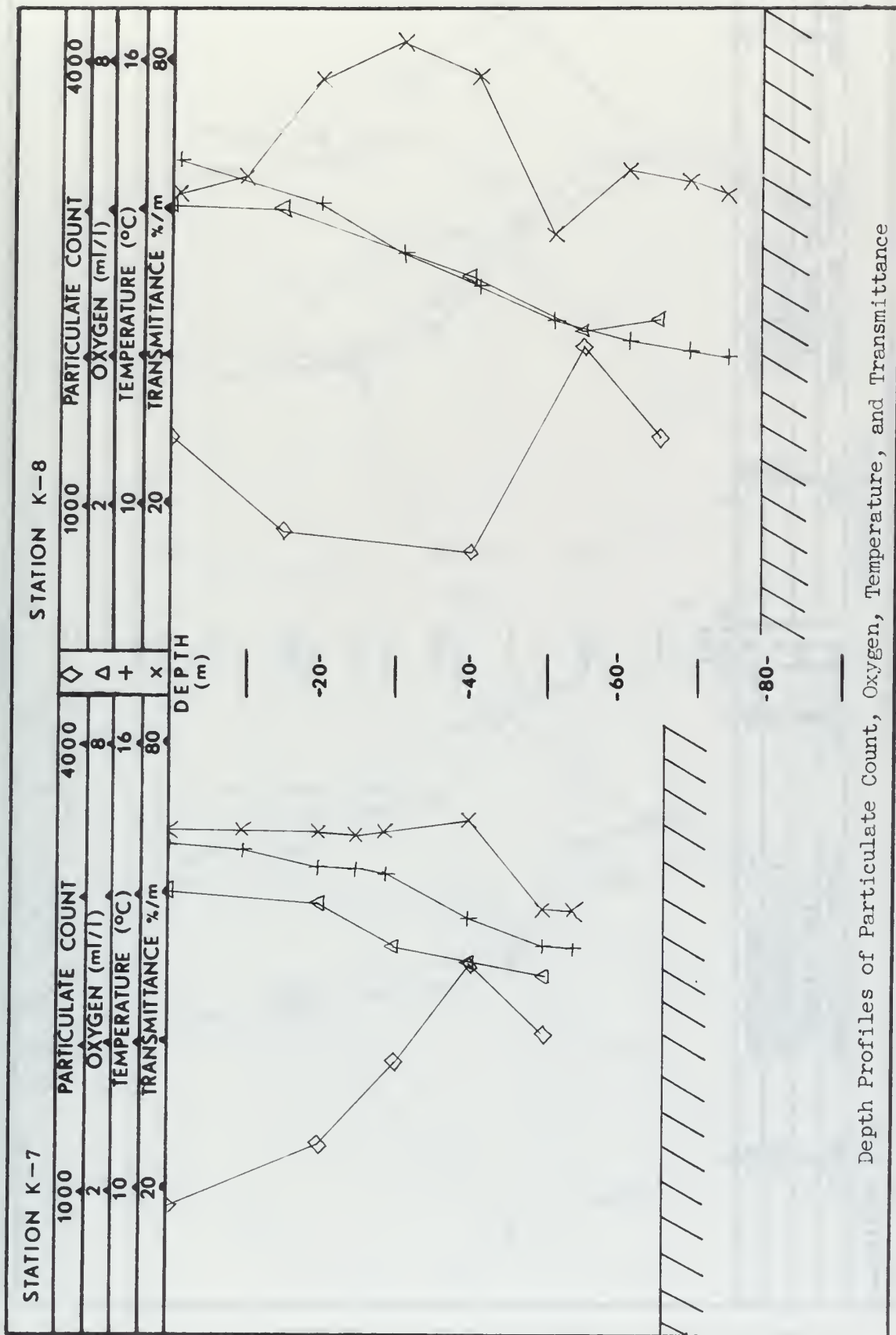
FIGURE 74





Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 75



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 76

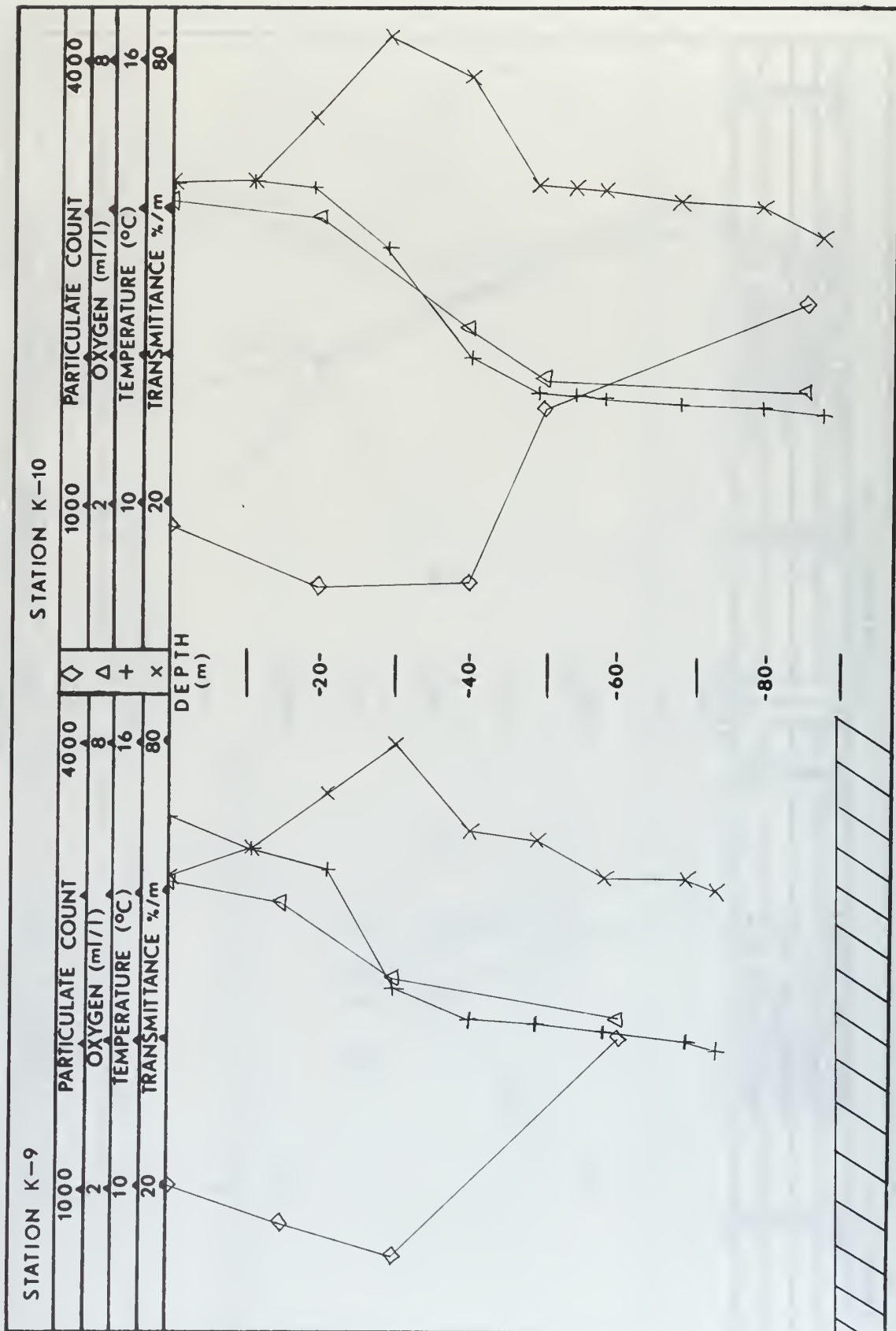


FIGURE 77

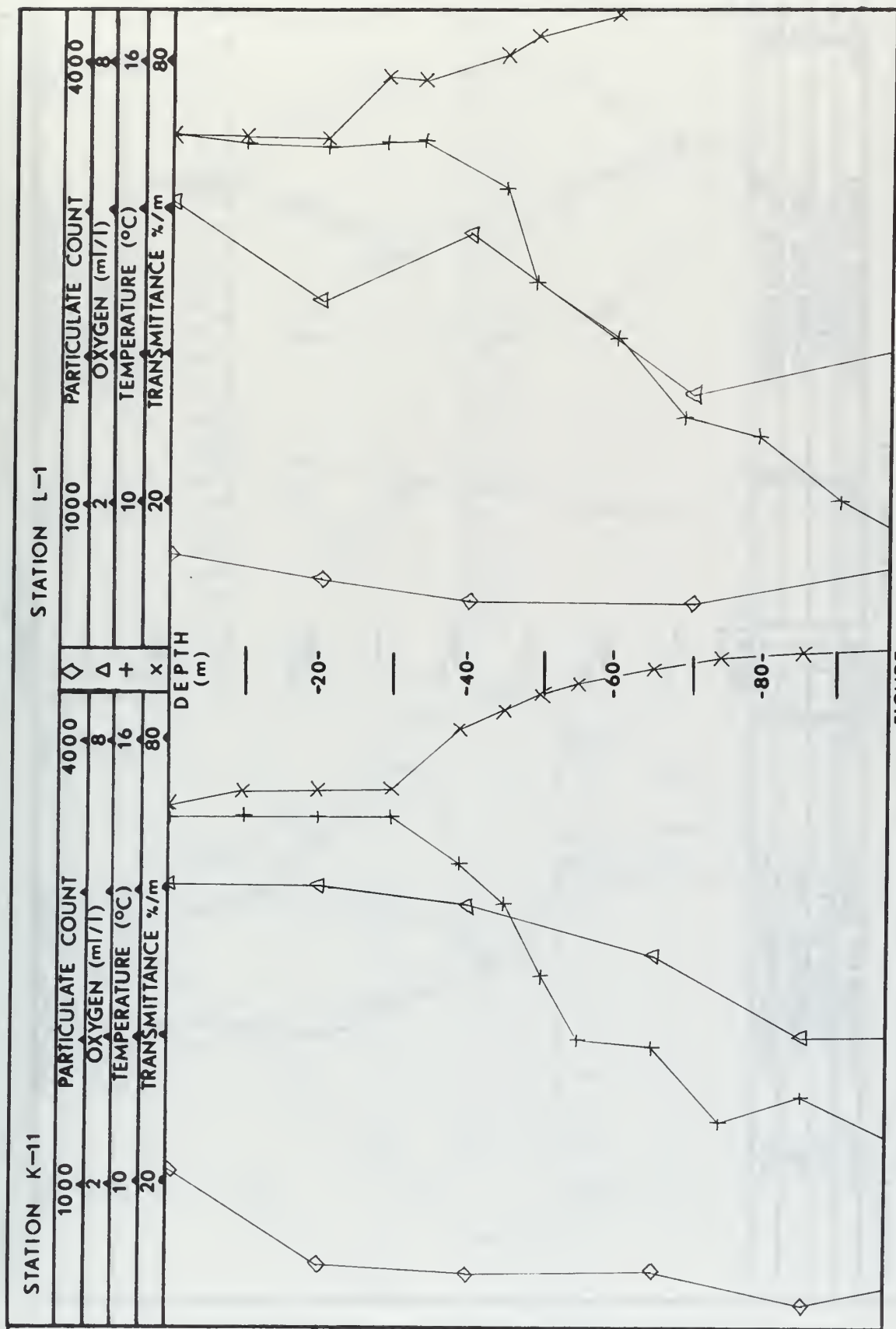


FIGURE 78



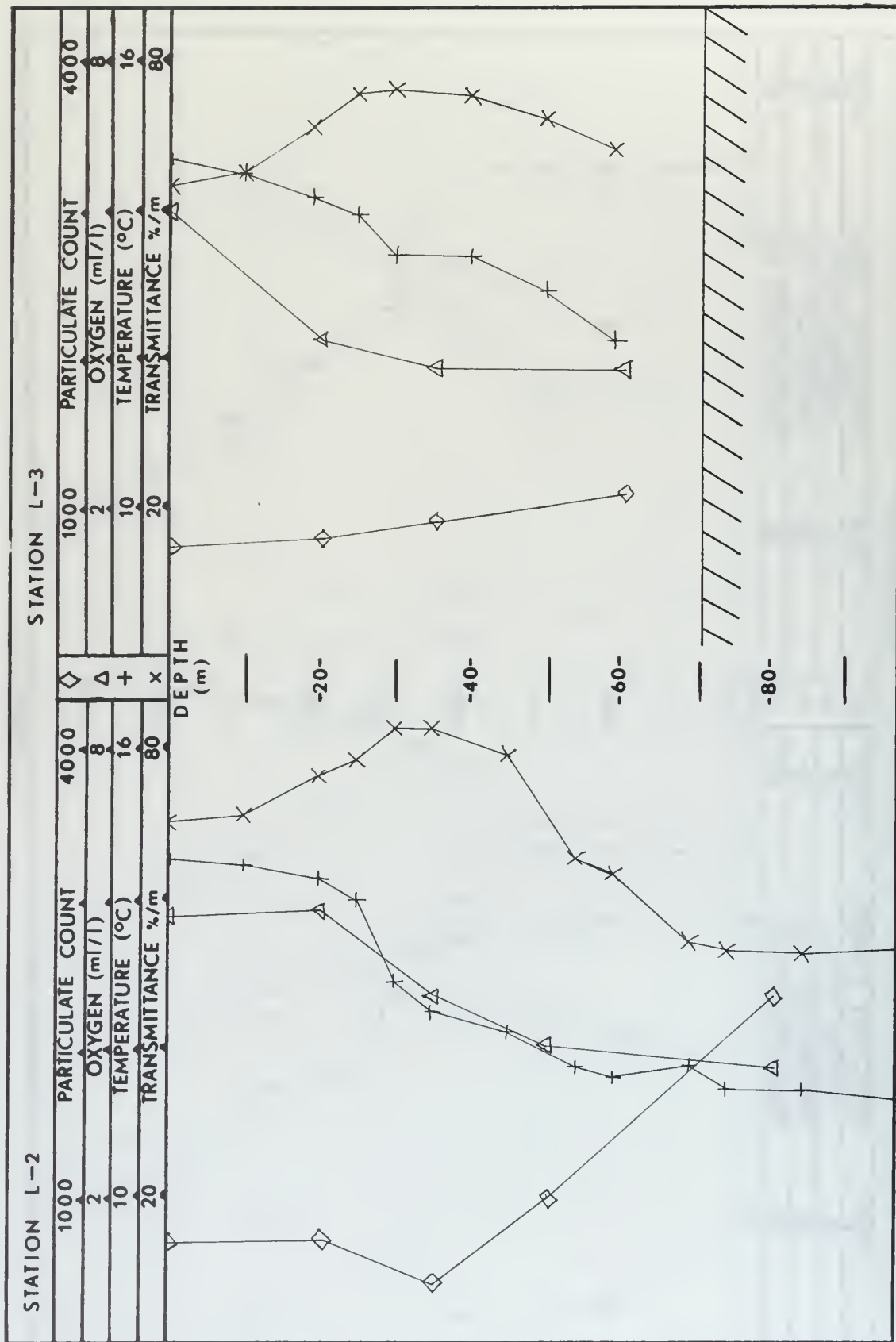
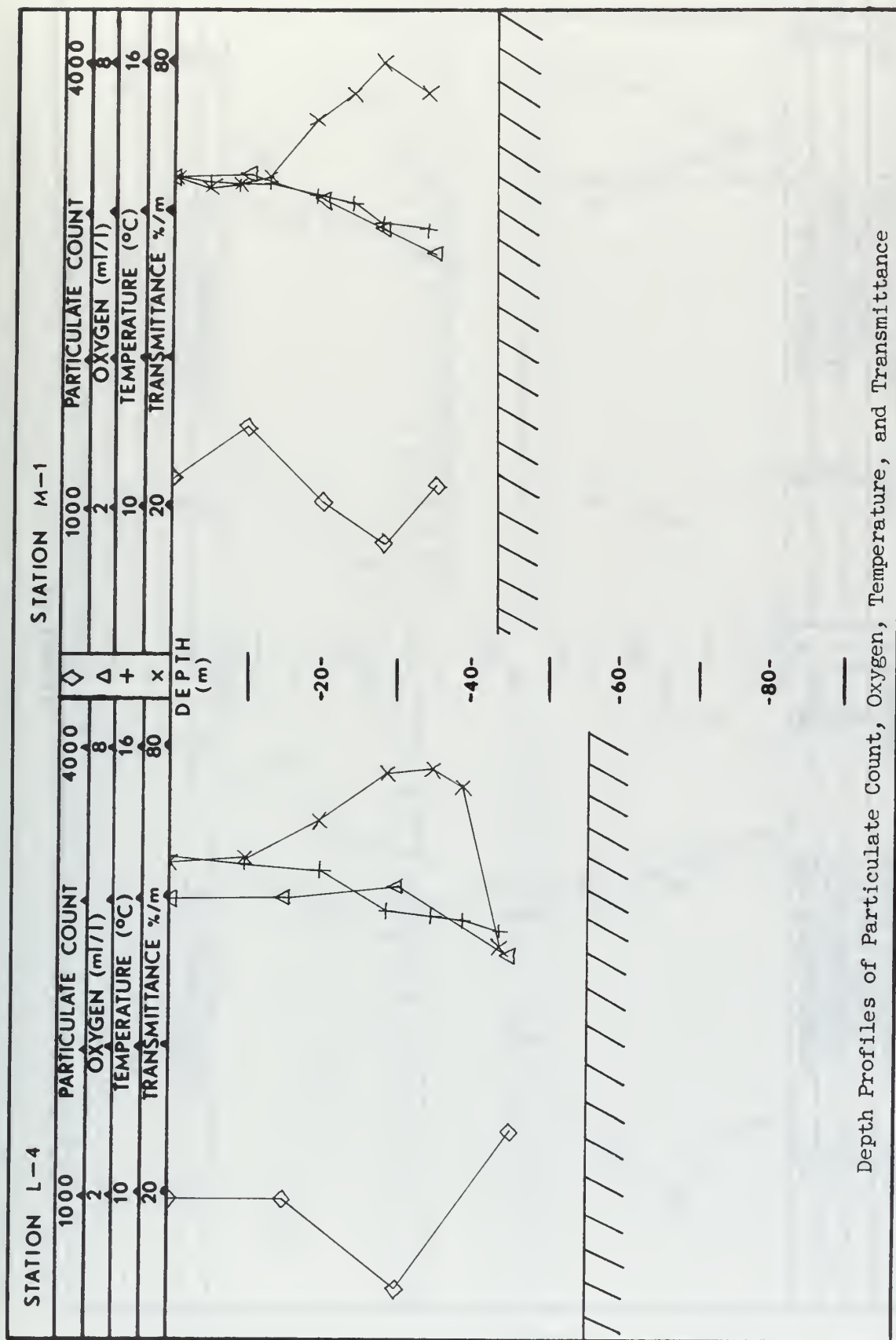
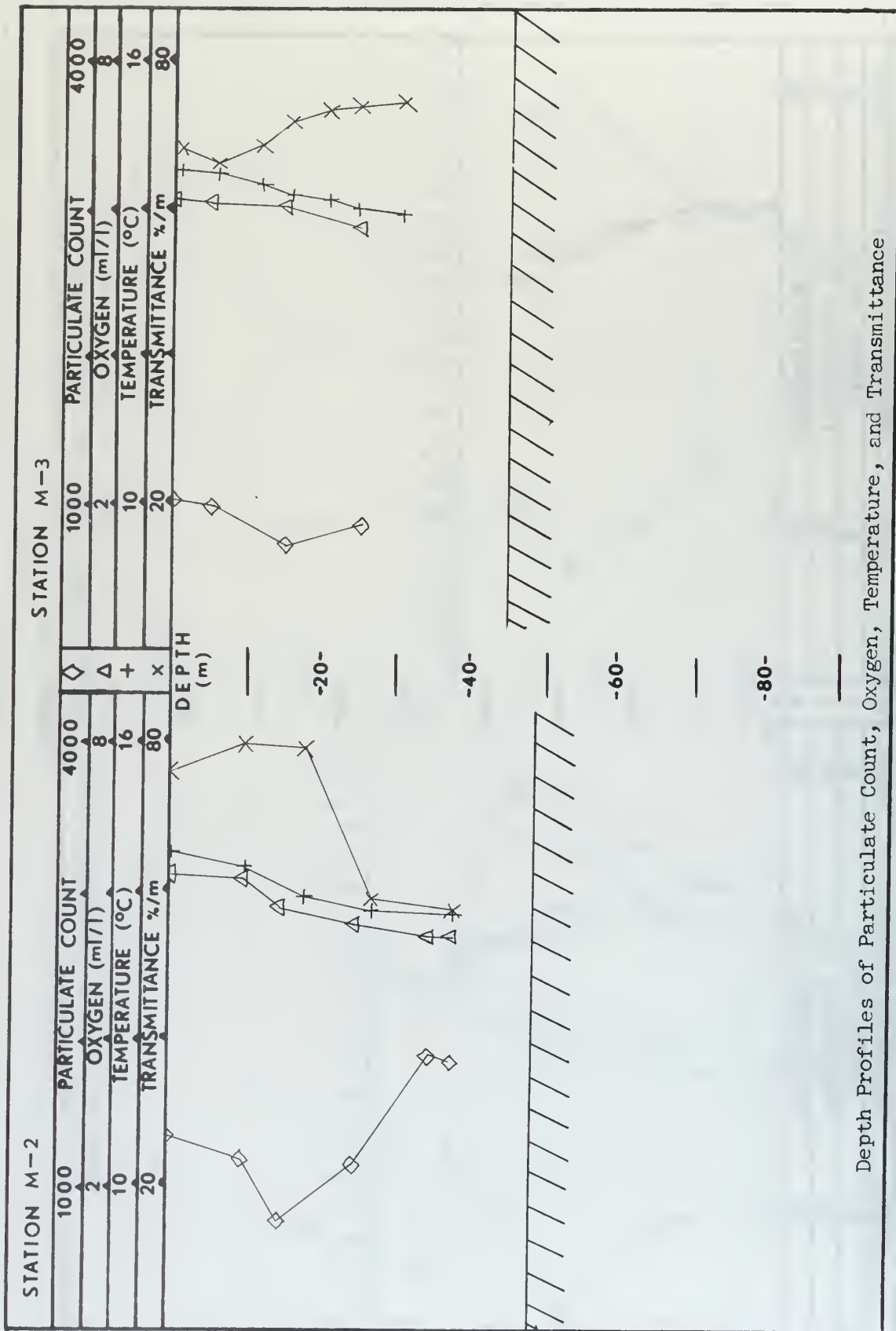


FIGURE 79



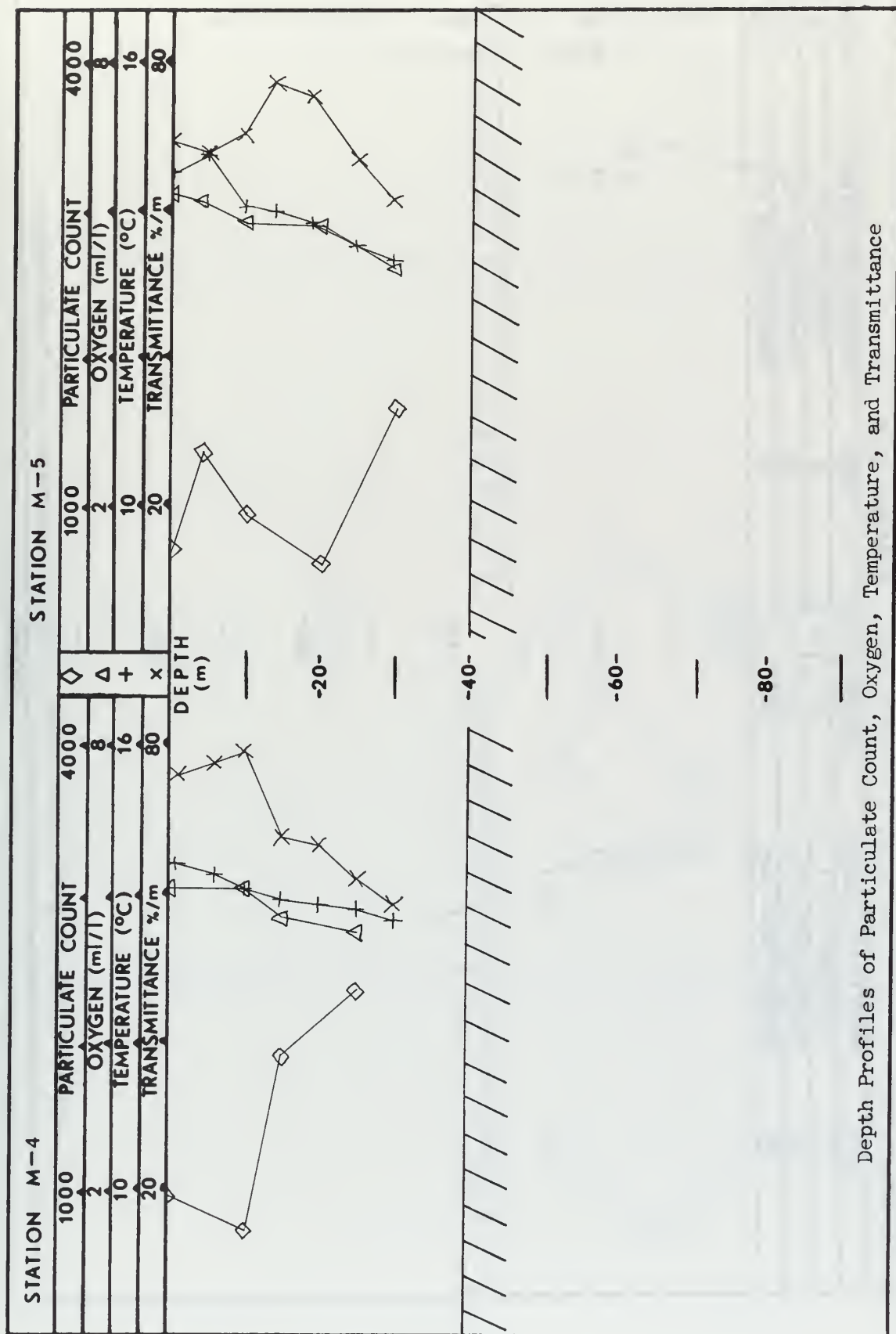
Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 80



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

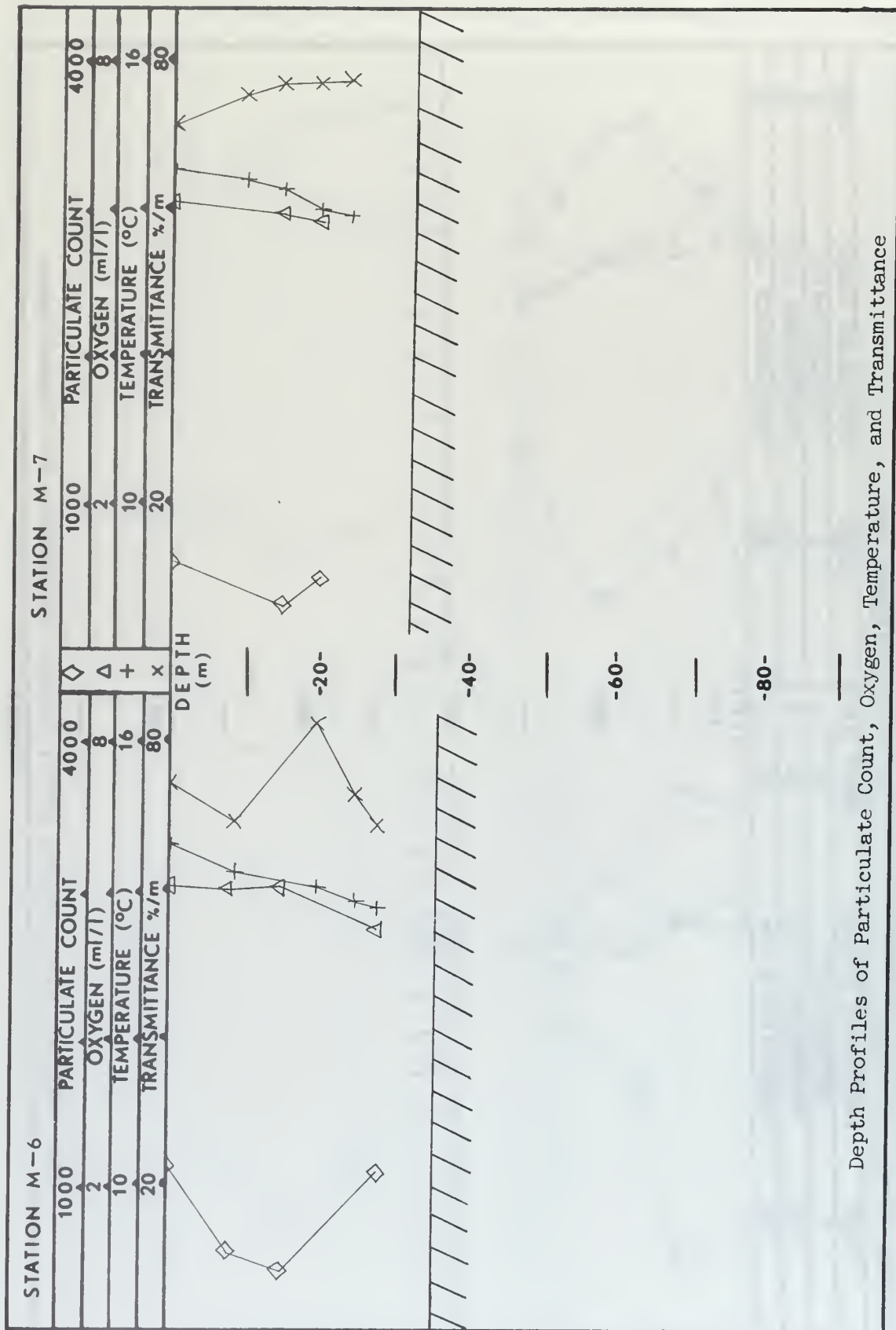
FIGURE 81



Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 82



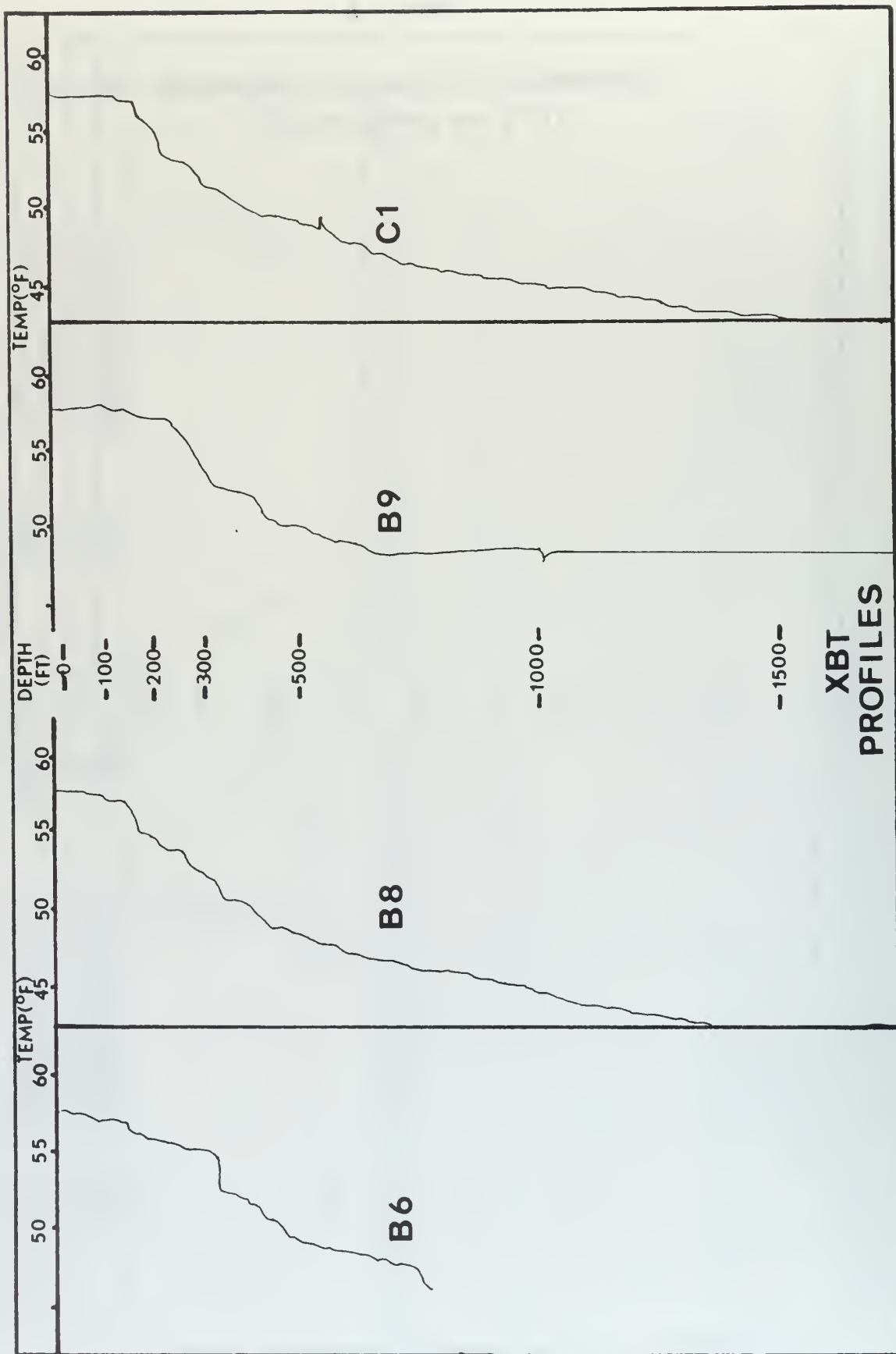


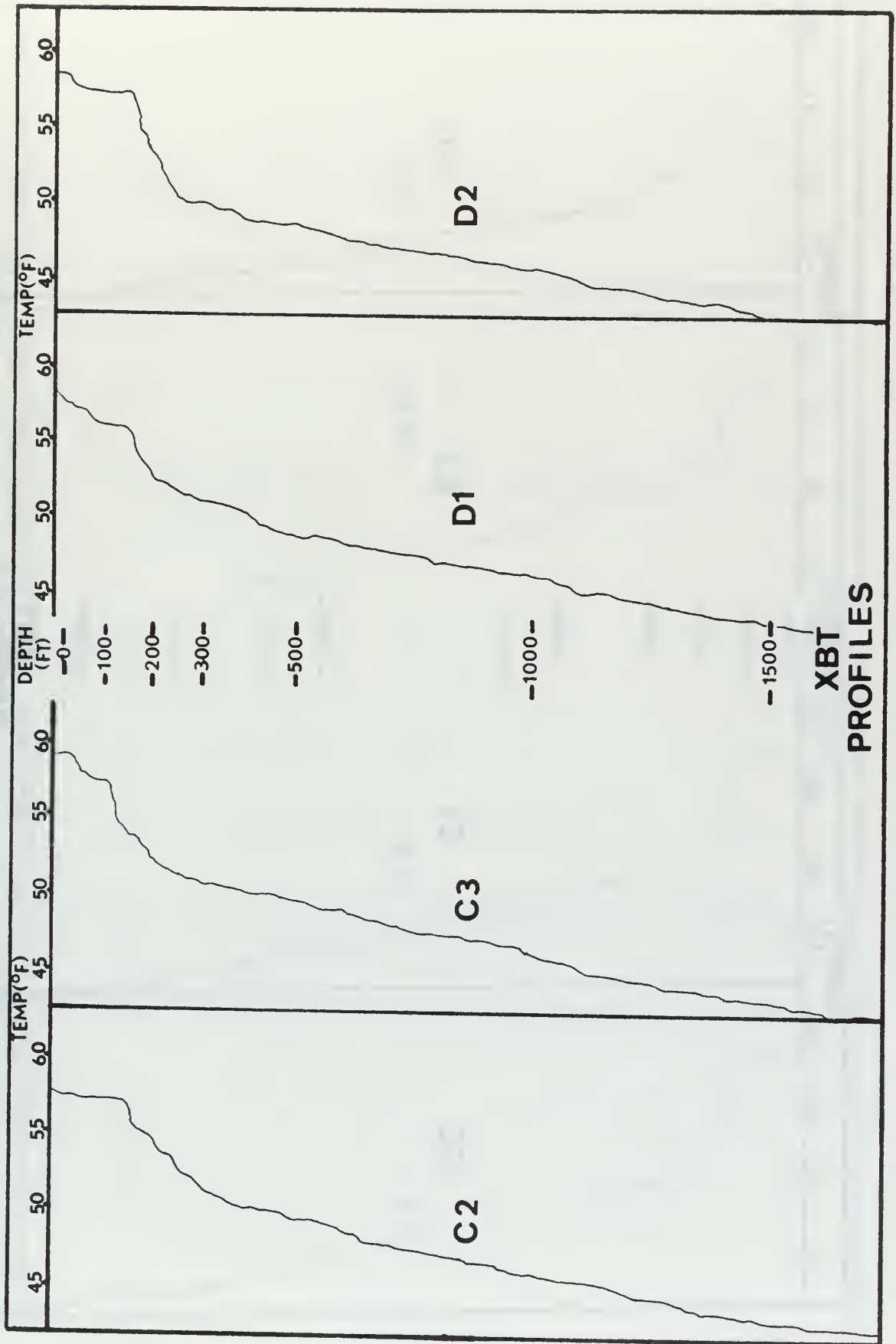
Depth Profiles of Particulate Count, Oxygen, Temperature, and Transmittance

FIGURE 83

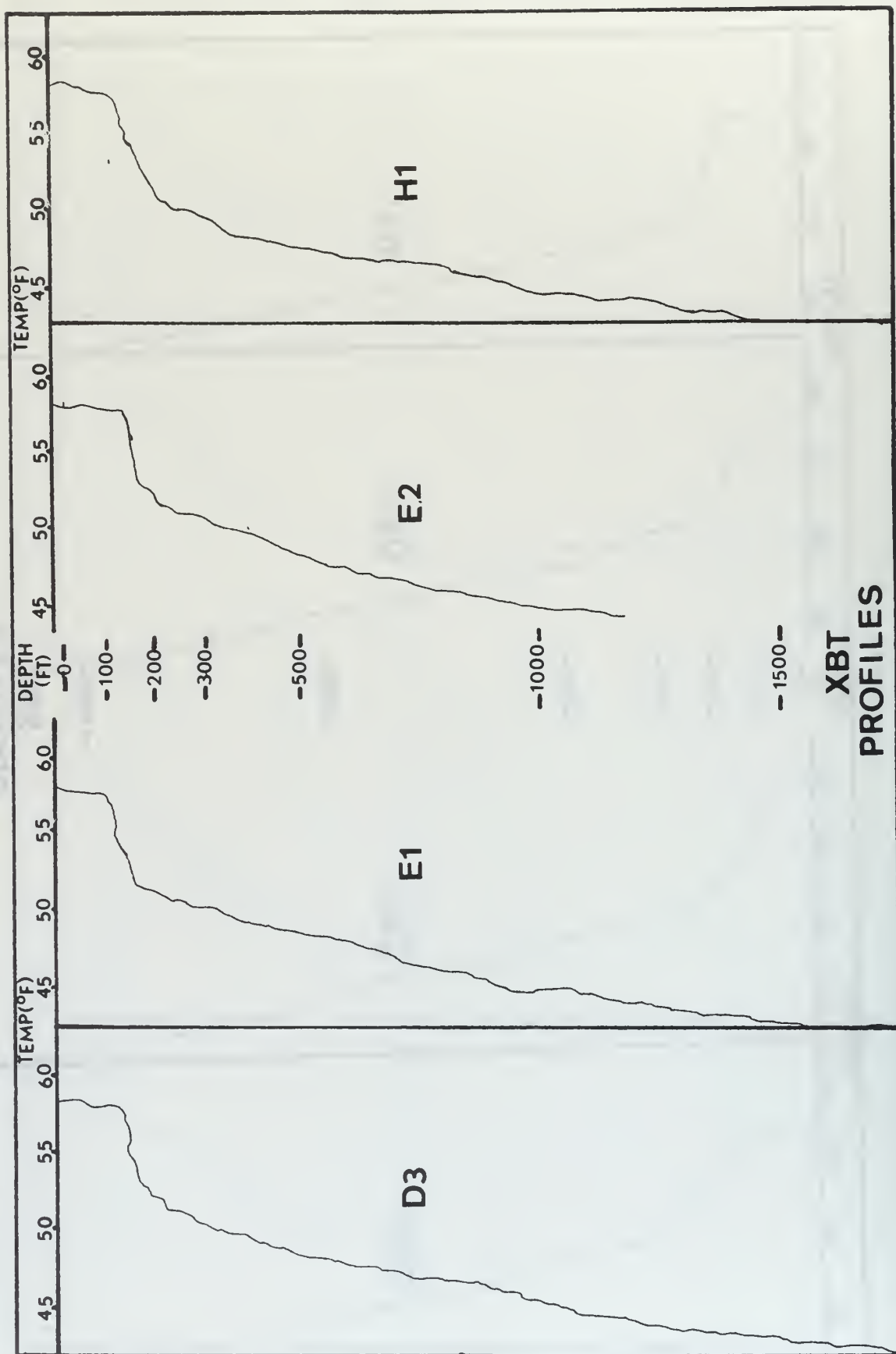
APPENDIX 8

BATHYTHERMOGRAPH TRACES WITH TEMPERATURES  
IN °F AND DEPTHS IN FEET









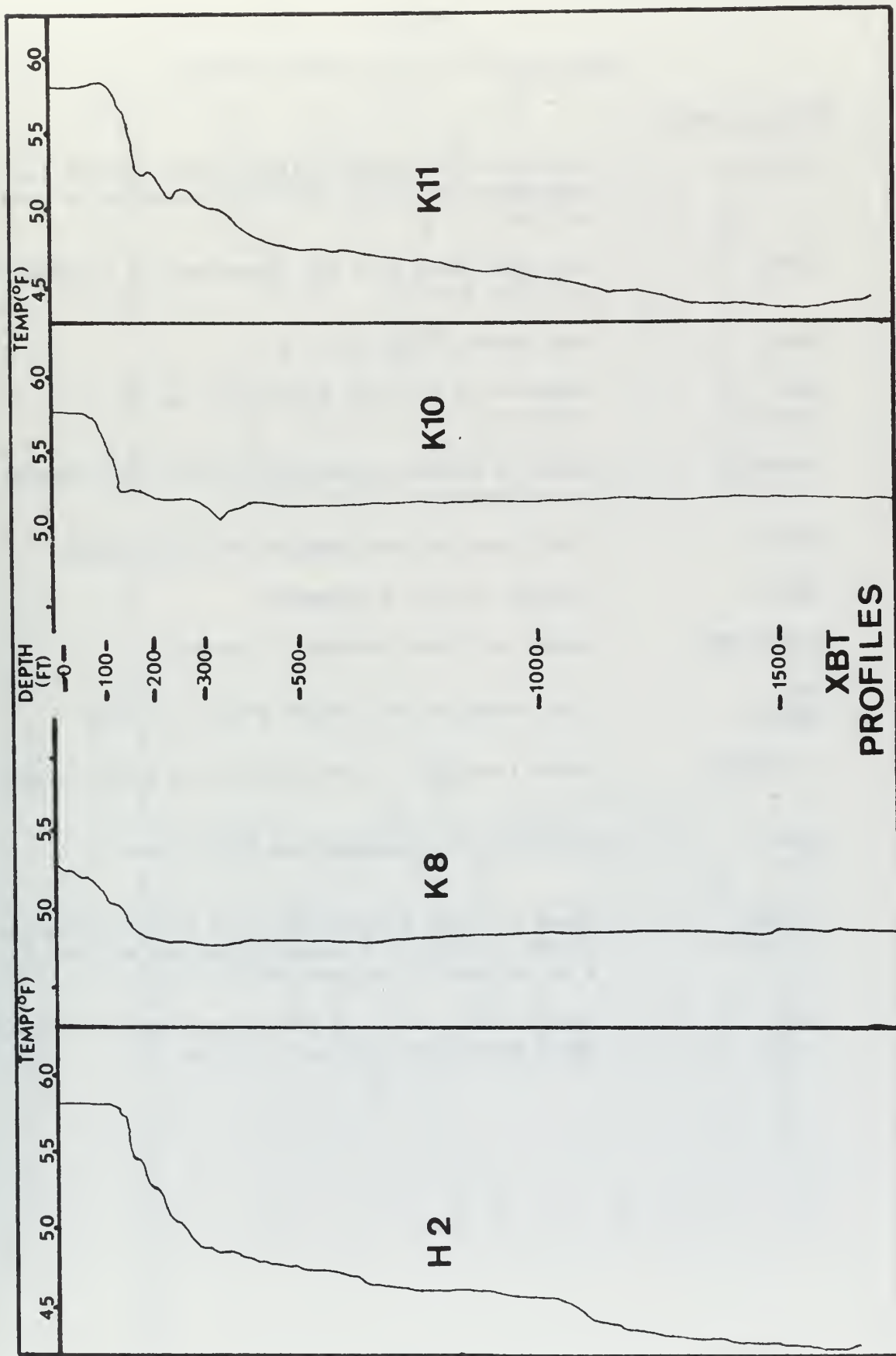


TABLE 1

## EXPLANATION OF DATA RECORD HEADINGS

Observed Data:

STATION:	Indicates the chronological order in which the stations were taken, with the exception of K-6a and K-7.
TIME:	The local time when the messenger was released to trip the cast.
DATE:	Day, month, year.
LAT:	Position of the ship during the period of observation.
LONG:	
SOUNDING:	Depth in meters as determined from echo sounder observations.
WIND:	True direction and speed reported in knots.
BARO:	Reading of ship's barometer.
CLOUD AMT:	Amount of cloud coverage in tenths.
SEA:	True direction and height given in feet.
SWELL:	
Z (DEPTH) m	Depth in meters as determined from SV/T/D probe.
TEMP: C°	Temperatures observed from SV/T/D probe.
SO VEL: m/sec	Speed of sound as measured with SV/T/D probe in meters per second. These values are all low by a value equal to approximately 3 m/sec.
TRAN: %/m	Beam transmittance in percent per meter for a one meter path and a wratten 61 filter.

TABLE 1

Station Data: Depth, Date, Time, Location, Weather, Sound Velocity, Temperature, and Beam Transmittance

STATION: A-1      DEPTH: 73 m  
 DATE: 7-11-69      TIME: 1300  
 LAT: 36°-39.2'      LONG: 121°-54.2'  
 WIND DIR: 165°      SPEED: 18  
 AIR TEMP(DRY): 62°      BARN: 29.86  
 CLOUD AMT: 10      HEIGHT(FT): 1000  
 SEA: -      SWELL: 270°-4

STA	Z	SO VEL	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
101	10	1499.7	13.40	55.3
101	30	1499.7	13.40	54.9
101	60	1499.7	14.38	55.2
101	100	1499.5	14.29	50.0

RELATIVE VALUES ONLY

STATION: A-2      DEPTH: 85 m  
 DATE: 7-11-69      TIME: 1700  
 LAT: 36°-40.8'      LONG: 121°-54.2'  
 WIND DIR: 180°      SPEED: 16  
 AIR TEMP(DRY): 60°      BARN: 29.86  
 CLOUD AMT: 10      HEIGHT(FT): 1000  
 SEA: -      SWELL: 270°-4

STA	Z	SO VEL	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
102	10	1500.1	14.69	59.8
102	60	1500.2	14.54	60.1
102	100	1500.2	14.54	60.1

RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: A-3		DEPTH: 83 m		
DATE: 7-11-69		TIME: 1900		
LAT: 36°-42.5'		LONG: 121°-54.0'		
WIND DIR: 090°		SPEED: 10		
AIR TEMP(DRY): 58°		BARO: 29.86		
CLOUD AMT: 10		HEIGHT(FT): 1000		
SEA: -		SWELL: 270°-4		
STA	Z	SO VEL	TEMP	TPAN
	(M)	(Z+1)	(C)	(%)
103	0.0	1499.2	14.28	65.2
103	5.0	1499.4	14.28	65.2
103	10.0	1499.5	14.28	65.1
103	15.0	1499.5	14.28	65.2
103	25.0	1499.6	14.25	65.5
103	35.0	1499.3	14.14	65.7
103	45.0	1498.6	13.80	72.0
103	50.0	1498.1	13.66	75.3
103	55.0	1498.1	13.62	76.2
103	60.0	1498.1	13.60	76.5
103	70.0	1497.8	13.45	78.8

- RELATIVE VALUES ONLY

STATION: A-4      DEPTH: 86 m  
 DATE: 7-11-69      TIME: 2100  
 LAT: 36°-43.9'      LONG: 121°-54.2'  
 WIND DIR: 090°      SPEED: 10  
 AIR TEMP(DRY): 58°      BARO: 29.86  
 CLOUD AMT: 10      HEIGHT(FT): 1000  
 SEA: -      SWELL: 270°-4

STA	Z (M)	SO VEL (Z+1) (C)	TEMP (C)	TPAN (%)
104	0.0	1498.2	14.25	65.5
104	5.0	1498.3	14.25	65.7
104	9.0	1499.3	14.25	65.6
104	14.0	1499.2	14.20	65.5
104	24.0	1498.9	13.95	64.3
104	34.0	1497.9	13.65	65.8
104	44.0	1497.7	13.56	70.0
104	54.0	1497.7	13.49	74.9
104	63.0	1497.6	13.41	77.7
104	74.0	1497.2	13.25	15.0

RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: A-5				STATION: A-6					
DATE: 7-11-69				DATE: 8-11-69					
LAT: 36°-45.4' LONG: 121°-54.3'				LAT: 36°-42.5' LONG: 121°-54.4'					
WIND DIR: 090°				WIND DIR: 090°					
AIR TEMP(DRY): 52°				AIR TEMP(DRY): 55°					
CLOUD AMT: 7				CLOUD AMT: 7					
SEA: 090°-4				SEA: 090°-4					
DEPTH: 202 m				DEPTH: 348 m					
TIME: 2300				TIME: 0100					
SPEED: 18				SPEED: 18					
BARO: 29.82				BARO: 29.75					
HEIGHT(FT): 2000				HEIGHT(FT): 2000					
SWELL: 270°-4				SWELL: 270°-4					
STA	Z	SO VEL*	TEMP	TRAN	STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)		(M)	(Z+1)	(C)	(%)
105	2.0	1498.8	14.16	67.3	106	1.0	1498.4	14.05	68.7
105	10.0	1499.0	14.15	67.3	106	6.0	1498.6	14.05	69.1
105	20.0	1499.0	14.08	65.9	106	15.0	1497.7	13.79	67.5
105	30.0	1497.9	13.71	66.0	106	22.0	1497.5	13.66	68.1
105	41.0	1497.9	13.64	67.0	106	32.0	1497.7	13.64	68.8
105	50.0	1497.5	13.46	72.2	106	41.0	1497.4	13.48	75.3
105	60.0	1497.6	13.46	73.7	106	46.0	1497.4	13.46	75.7
105	71.0	1497.7	13.43	75.8	106	54.0	1497.4	13.42	76.0
105	80.0	1497.7	13.39	77.1	106	57.0	1497.3	13.41	78.3
105	90.0	1497.4	13.50	39.1	106	69.0	1497.3	13.35	77.2
105	95.0	1497.2	13.13	29.3	106	80.0	1497.4	13.32	75.4
105	101.0	1493.6	12.06	49.3	106	82.0	1497.5	13.33	74.8
RELATIVE VALUES ONLY					106	94.0	1497.5	13.28	67.2
					106	96.0	1497.5	13.26	65.0

TABLE 1 (Cont.)

STATION: A-7      DEPTH: --  
 DATE: 8-11-69      TIME: 0300  
 LAT: 36°-48.2'      LONG: 121°-54.3'  
 WIND DIR: 100°      SPEED: 15  
 AIR TEMP(DRY): 58°      BARO: 29.71  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
107	2.0	1498.3	13.97	67.9
107	9.0	1498.4	13.99	68.2
107	17.0	1497.9	13.88	69.7
107	26.0	1497.4	13.59	71.4
107	32.0	1497.4	13.59	72.3
107	40.0	1497.6	13.57	75.4
107	46.0	1497.4	13.50	75.4
107	55.0	1497.4	13.47	76.5
107	64.0	1497.3	13.36	73.0
107	66.0	1497.2	13.35	77.4
107	70.0	1497.3	13.35	77.6
107	77.0	1497.5	13.35	77.7
107	84.0	1497.4	13.29	54.3
107	98.0	1497.4	13.20	67.1

STATION: A-8      DEPTH: 68 m  
 DATE: 8-11-69      TIME: 0500  
 LAT: 36°-48.8'      LONG: 121°-54.4'  
 WIND DIR: 090°      SPEED: 25  
 AIR TEMP(DRY): 58°      BARO: 29.72  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
108	0.0	1497.1	13.94	69.3
108	9.0	1498.3	13.95	69.4
108	19.0	1498.0	13.80	70.3
108	29.0	1497.5	13.57	72.9
108	34.0	1497.5	13.53	73.9
108	44.0	1497.2	13.41	69.7
108	49.0	1497.3	13.40	76.8
108	56.0	1497.3	13.35	71.5
108	60.0	1497.0	13.28	70.0

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: A-9				DEPTH: 46 m					
DATE: 8-11-69				TIME: 0630					
LAT: 36°-51.1'				LONG: 121°-54.3'					
WIND DIR: 090°				SPEED: 25					
AIR TEMP(DRY): 58°				BARO: 29.72					
CLOUD AMT: Clear				HEIGHT(FT): -					
SEA: -				SWELL: 270°-4					
STA	Z	SO VEL	TEMP	TRAN	STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)		(M)	(Z+1)	(C)	(%)
109	0.0	1498.0	13.88	70.0	110	2.0	1497.4	13.70	69.5
109	4.0	1498.0	13.88	70.2	110	5.0	1497.4	13.70	70.1
109	13.0	1498.2	13.87	69.6	110	14.0	1497.6	13.70	70.1
109	23.0	1497.9	13.74	69.3	110	20.0	1497.6	13.67	67.5
109	28.0	1497.7	13.60	74.8	110	24.0	1497.6	13.65	52.7
109	34.0	1496.8	13.35	72.9	110	29.0	1497.6	13.61	30.1
109	38.0	1496.7	13.27	69.1					
RELATIVE VALUES ONLY					RELATIVE VALUES ONLY				



TABLE 1 (Cont.)

STATION: A-11		DEPTH: 23 m	STATION: A-12		DEPTH: 17 m
DATE: 8-11-69		TIME: 0915	DATE: 8-11-69		TIME: 1040
LAT: 36°-54.1'		LONG: 121°-54.3'	LAT: 36°-55.6'		LONG: 121°-54.5'
WIND DIR: 110°		SPEED: 25	WIND DIR: 110°		SPEED: 25
AIR TEMP(DRY): 59°		BARO: 29.73	AIR TEMP(DRY): 59°		BARO: 29.73
CLOUD AMT: 7		HEIGHT(FT): 2000	CLOUD AMT: 7		HEIGHT(FT): 2000
SEA: 110°-4		SWELL: 270°-4	SEA: 110°-4		SWELL: 270°-4
STA	Z	SO VEL*	TEMP	TRAN	
	(M)	(Z+1)	(C)	(%)	
111	1.0	1497,2	13,62	55,6	
111	4.0	1497,2	13,60	48,3	
111	9.0	1497,3	13,59	43,7	
111	14.0	1497,3	13,59	47,2	
RELATIVE VALUES ONLY					
STA	Z	SO VEL*	TEMP	TRAN	
	(M)	(Z+1)	(C)	(%)	
112	1.0	1498,3	13,99	11,2	
112	5.0	1498,2	13,95	11,9	
112	8.0	1498,3	13,96	11,4	
112	11.0	1498,4	13,96	11,0	
RELATIVE VALUES ONLY					

TABLE 1 (Cont.)

STATION: B-1		DEPTH: 16 m		
DATE: 8-11-69		TIME: 1215		
LAT: 36°-56.3'		LONG: 121°-59.2'		
WIND DIR: 110°		SPEED: 25		
AIR TEMP(DRY): 61°		BARO: 29.71		
CLOUD AMT: 7		HEIGHT(FT): 2000		
SEA: 110°-4		SWELL: 270°-4		
STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
201	1.0	1497.9	13.87	27.9
201	7.0	1497.9	13.84	20.2
201	8.0	1497.9	13.83	11.5
* RELATIVE VALUES ONLY				

STATION: B-2		DEPTH: 26 m		
DATE: 8-11-69		TIME: 1320		
LAT: 36°-54.7'		LONG: 121°-59.1'		
WIND DIR: 100°		SPEED: 15		
AIR TEMP(DRY): 63°		BARO: 29.70		
CLOUD AMT: 5		HEIGHT(FT): 2000		
SEA: 110°-2		SWELL: 270°-4		
STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
202	2.0	1498.0	13.87	65.1
202	6.0	1498.0	13.86	65.3
202	10.0	1498.0	13.85	65.6
202	15.0	1497.9	13.79	63.8
202	20.0	1497.7	13.67	55.8
* RELATIVE VALUES ONLY				

TABLE 1 (Cont.)

STATION: B-3      DEPTH: 30 m  
 DATE: 8-11-69      TIME: 1415  
 LAT: 36°-53.5'      LONG: 121°-59.4'  
 WIND DIR: 100°      SPEED: 15  
 AIR TEMP(DRY): 63°      BARO: 29.70  
 CLOUD AMT: 5      HEIGHT(FT): 2000  
 SEA: 110°-2      SWELL: 270°-4

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
203	2.0	1498.6	14.06	64.7
203	6.0	1498.6	14.04	64.5
203	15.0	1498.1	13.84	64.8
203	19.0	1498.2	13.83	64.4
203	25.0	1498.1	13.77	61.3

RELATIVE VALUES ONLY

STATION: B-4      DEPTH: 58 m  
 DATE: 8-11-69      TIME: 1530  
 LAT: 36°-51.9'      LONG: 121°-59.0'  
 WIND DIR: 100°      SPEED: 15  
 AIR TEMP(DRY): 63°      BARO: 29.69  
 CLOUD AMT: 7      HEIGHT(FT): 2000  
 SEA: 110°-2      SWELL: 270°-4

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
204	1.0	1498.6	14.07	68.5
204	5.0	1498.7	14.06	68.5
204	11.0	1498.7	14.04	69.2
204	20.0	1498.5	13.91	72.5
204	25.0	1497.8	13.66	67.3
204	31.0	1497.2	13.47	69.6
204	40.0	1496.9	13.35	61.4
204	45.0	1497.4	13.34	63.5
204	50.0	1496.9	13.28	49.5

RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: B-5				DEPTH: 81 m					
DATE: 8-11-69				TIME: 1650					
LAT: 36°-50.7' LONG: 121°-59.4'									
WIND DIR: 100°				SPEED: 15					
AIR TEMP(DRY): 63°				BARO: 29.69					
CLOUD AMT: 7				HEIGHT(FT): 2000					
SEA: 110°-2				SWELL: 270°-4					
STA	Z	SO VEL*	TEMP	TRAN	STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)		(M)	(Z+1)	(C)	(%)
205	0.0	1498.8	14.11	76.7	206	0.0	1499.9	14.47	71.2
205	6.0	1498.8	14.10	76.5	206	4.0	1499.8	14.43	71.9
205	16.0	1498.5	13.96	71.7	206	14.0	1499.6	14.31	73.9
205	21.0	1498.5	13.91	72.1	206	24.0	1499.3	14.19	75.6
205	31.0	1497.5	13.62	69.4	206	34.0	1499.0	14.03	76.0
205	37.0	1497.3	13.49	70.1	206	44.0	1498.8	13.90	71.7
205	45.0	1497.3	13.41	72.0	206	53.0	1497.8	13.53	75.5
205	56.0	1496.5	13.09	52.5	206	64.0	1497.2	13.31	76.4
205	61.0	1496.4	13.07	46.4	206	68.0	1496.9	13.19	70.1
205	66.0	1496.5	13.06	44.2	206	74.0	1496.9	13.14	64.4
205	69.0	1496.5	13.07	37.6	206	83.0	1496.8	13.08	62.1
RELATIVE VALUES ONLY					206	94.0	1496.8	13.03	59.4
					206	98.0	1496.7	12.98	56.4



TABLE 1 (Cont.)

STATION: B-7		DEPTH: 320 m		
DATE: 8-11-69		TIME: 2015		
LAT: 36°-47.4'		LONG: 121°-59.0'		
WIND DIR: 315°		SPEED: 8		
AIR TEMP(DRY): 53°		BARO: 29.74		
CLOUD AMT: Clear		HEIGHT(FT): -		
SSFA: -		SWELL: 270°-4		
STA	Z	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
207	1.0	1499.6	14.40	77.5
207	3.0	1499.5	14.35	79.1
207	10.0	1499.6	14.34	79.1
207	18.0	1499.6	14.28	79.9
207	30.0	1499.6	14.24	79.9
207	49.0	1499.0	13.91	73.0
207	50.0	1497.9	13.57	39.5
207	68.0	1497.3	13.29	52.4
207	77.0	1496.3	12.91	36.8
207	88.0	1494.3	12.30	30.5
207	98.0	1492.8	11.79	62.0

\* RELATIVE VALUES ONLY

STATION: B-8 DEPTH: 882 m  
 DATE: 8-11-69 TIME: 2230  
 LAT: 36°-47.0' LONG: 121°-59.2'  
 WIND DIR: 090° SPEED: 12  
 AIR TEMP(DRY): 59° BARO: 29.76  
 CLOUD AMT: 4 HEIGHT(FT): 2000  
 SEA: 100°-2 SWELL: 270°-4

STA	Z (M)	SO VEL* (Z+1) (C)	TEMP (C)	TRAN (%)
208	1.0	1499.9	14.51	71.8
208	9.0	1500.2	14.53	72.4
208	19.0	1500.2	14.48	71.7
208	29.0	1500.1	14.39	74.9
208	40.0	1499.6	14.20	74.2
208	49.0	1499.5	14.10	76.8
208	59.0	1495.9	13.19	77.7
208	69.0	1495.1	12.95	77.1
208	79.0	1495.1	12.60	69.3
208	89.0	1494.9	12.49	74.8
208	101.0	1493.2	11.95	76.3

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: B-9                  DEPTH: 306 m  
 DATE: 9-11-69              TIME: 0130  
 LAT: 36°-44.6'    LONG: 121°-58.5'  
 WIND DIR: Var.              SPEED: 0-2  
 AIR TEMP(DRY): 58°      BARN: 29.85  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -                  SWELL: 270°-3

STA	7	SD VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
209	1.0	1500.2	14.58	63.1
209	6.0	1500.3	14.58	63.8
209	9.0	1500.4	14.58	63.8
209	16.0	1500.5	14.58	63.8
209	26.0	1500.6	14.57	64.0
209	36.0	1500.6	14.47	67.0
209	46.0	1500.0	14.21	66.0
209	55.0	1499.9	14.17	63.9
209	65.0	1499.9	14.13	63.0
209	77.0	1499.8	13.94	65.8
209	89.0	1498.1	13.37	58.0
209	98.0	1495.9	12.91	62.0

\* RELATIVE VALUES ONLY

STATION: B-10 DEPTH: 320 m  
 DATE: 9-11-69 TIME: 0255  
 LAT: 36°-43.0' LONG: 121°-58.9'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARD: 29.85  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SFA: - SWELL: 270°-3

TABLE 1 (Cont.)

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
210	1.0	1500.4	14.64	63.5
210	6.0	1500.4	14.64	63.4
210	10.0	1500.6	14.63	63.4
210	15.0	1500.6	14.64	63.9
210	21.0	1500.7	14.63	64.0
210	25.0	1500.7	14.62	64.0
210	30.0	1500.7	14.59	64.3
210	34.0	1500.5	14.49	66.0
210	40.0	1500.4	14.43	67.0
210	45.0	1500.4	14.41	67.2
210	50.0	1500.5	14.40	67.8
210	55.0	1500.0	14.24	65.9
210	62.0	1500.1	14.21	64.8
210	72.0	1500.2	14.21	63.8
210	80.0	1500.2	14.15	63.2
210	85.0	1500.2	14.13	63.2
210	91.0	1499.5	13.84	65.0
210	101.0	1497.1	13.10	64.0

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: B-11 DEPTH: 113 m  
 DATE: 9-11-69 TIME: 0500  
 LAT: 36°-41.4' LONG: 121°-59.2  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARD: 29.84  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 270°-3

STA	Z (M)	SD VEL* (Z+1)	TEMP (C)	TRAN (%)
211	5.0	1500.4	14.59	65.1
211	10.0	1500.5	14.60	65.0
211	15.0	1500.6	14.59	65.0
211	20.0	1500.6	14.60	65.0
211	27.0	1500.8	14.60	65.7
211	36.0	1500.8	14.56	66.3
211	50.0	1501.1	14.56	66.9
211	66.0	1501.1	14.56	67.0
211	64.0	1501.2	14.56	66.8
211	71.0	1501.3	14.52	66.5
211	79.0	1500.2	14.21	66.0
211	85.0	1500.1	14.10	66.0

\* RELATIVE VALUES ONLY



STATION: B-12      DEPTH: 108 m  
 DATE: 9-11-69      TIME: 0630  
 LAT: 36°-40.1'      LONG: 121°-59.3'  
 WIND DIR: 060°      SPEED: 10  
 AIR TEMP(DRY): 60°      BARO: 29.83  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

TABLE 1 (Cont.)

STA	Z	SD VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
212	0.0	1499.7	14.39	63.9
212	5.0	1499.7	14.39	64.0
212	10.0	1499.8	14.39	64.0
212	15.0	1499.9	14.39	64.0
212	20.0	1499.8	14.34	64.4
212	28.0	1499.9	14.33	65.0
212	35.0	1500.1	14.34	65.0
212	41.0	1500.2	14.35	64.8
212	46.0	1500.3	14.36	65.0
212	52.0	1500.2	14.33	66.0
212	55.0	1500.4	14.33	66.0
212	60.0	1500.3	14.30	65.0
212	65.0	1500.1	14.21	65.8
212	71.0	1500.2	14.18	65.0
212	74.0	1500.2	14.17	65.0
212	81.0	1500.2	14.14	64.3
212	87.0	1499.4	13.82	60.0
212	91.0	1497.8	13.31	56.0
212	97.0	1494.0	12.16	55.0

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: B-13      DEPTH: 74 m  
 DATE: 9-11-69      TIME: 0815  
 LAT: 36°-38.2'      LONG: 121°-59.3'  
 WIND DIR: 045°      SPEED: 10  
 AIR TEMP(DRY): 62      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(7+1)	(C)	(%)
213	1.0	1500.0	14.50	64.8
213	31.0	1500.2	14.50	65.8
213	55.0	1500.0	14.23	64.2
213	65.0	1498.6	13.72	67.2

\* RELATIVE VALUES ONLY

STATION: C-1            DEPTH: 650 m  
 DATE: 9-11-69    TIME: 0945  
 LAT: 36°-36.0'    LONG: 121°-02.2'  
 WIND DIR: 040°        SPEED: 15  
 AIR TEMP(DRY): 58°    BARO: 29.80  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: 040°-3        SWELL: 270°-4

TABLE 1 (Cont.)

STA	Z	SD VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
301	1.0	1499.9	14.46	58.9
301	5.0	1499.8	14.44	60.0
301	10.0	1499.8	14.39	60.0
301	16.0	1499.8	14.38	60.0
301	21.0	1499.8	14.36	61.5
301	26.0	1500.0	14.37	61.0
301	32.0	1500.0	14.35	61.3
301	36.0	1500.1	14.35	62.0
301	40.0	1500.1	14.34	62.0
301	45.0	1500.1	14.32	60.0
301	50.0	1499.8	14.17	63.0
301	55.0	1498.6	13.74	65.0
301	61.0	1497.4	13.40	65.2
301	75.0	1494.5	12.40	74.0
301	80.0	1493.9	12.22	72.5
301	86.0	1493.9	12.21	72.0
301	90.0	1493.8	12.14	71.3
301	95.0	1492.9	11.82	77.0
301	100.0	1491.9	11.48	78.0

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: C-2      DEPTH: 1094 m  
 DATE: 9-11-69      TIME: 1130  
 LAT: 36°-34.0' LONG: 121°-04.3'  
 WIND DIR: 040°      SPEED: 15  
 AIR TEMP(DRY): 61°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: 040°-3      SWELL: 270°-4

STA	Z (M)	SO VEL* (7+1)	TEMP (C)	TRAN (%)
302	0.0	1499.6	14.40	66.0
302	10.0	1499.5	14.29	64.8
302	20.0	1499.5	14.24	69.0
302	30.0	1499.6	14.21	70.7
302	50.0	1499.5	14.10	74.2
302	60.0	1496.3	13.07	80.5
302	71.0	1494.5	12.45	81.4
302	81.0	1492.8	11.92	81.8
302	90.0	1491.8	11.53	83.9
302	101.0	1490.9	11.24	87.2

\* RELATIVE VALUES ONLY

STATION: C-3      DEPTH: 1244 m  
 DATE: 9-11-69      TIME: 1315  
 LAT: 36°-31.6' LONG: 121°-07.0'  
 WIND DIR: 310°      SPEED: 10  
 AIR TEMP(DRY): 60°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
303	1.0	1501.9	15.12	68.1
303	11.0	1501.9	15.07	66.3
303	20.0	1500.1	14.46	68.3
303	32.0	1499.5	14.22	70.7
303	41.0	1497.9	13.83	79.5
303	45.0	1495.4	12.84	81.8
303	50.0	1494.9	12.75	82.3
303	59.0	1493.8	12.30	83.7
303	69.0	1491.4	11.52	89.6
303	75.0	1490.4	11.18	88.7
303	84.0	1490.0	11.02	89.5
303	100.0	1489.6	10.94	88.2



TABLE 1 (Cont.)

STATION: D-1      DEPTH: -  
 DATE: 9-11-69      TIME: 1445  
 LAT: 36°-34.9'      LONG: 121°-11.2'  
 WIND DIR: 310°      SPEED: 10  
 AIR TEMP(DRY): 60°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

STA	Z (M)	SO (Z+1)	VEL (C)	TEMP (C)	TRAN (%)
401	2.0	1500.1	14.53	67.3	
401	11.0	1499.5	14.32	68.5	
401	20.0	1499.3	14.21	69.1	
401	31.0	1498.7	14.00	68.4	
401	40.0	1497.9	13.68	71.6	
401	49.0	1494.2	12.47	85.2	
401	56.0	1493.6	12.23	85.3	
401	65.0	1492.1	11.78	86.3	
401	75.0	1491.0	11.43	85.9	
401	85.0	1490.2	11.10	85.9	
401	100.0	1489.2	10.77	87.2	

RELATIVE VALUES ONLY

STATION: D-2      DEPTH: 1373 m  
 DATE: 9-11-69      TIME: 1630  
 LAT: 36°-39.1'      LONG: 121°-15.1'  
 WIND DIR: 310°      SPEED: 10  
 AIR TEMP(DRY): 60°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 270°-4

STA	Z (M)	SO (Z+1)	VEL (C)	TEMP (C)	TRAN (%)
402	0.0	1500.3	14.71	83.4	
402	8.0	1499.7	14.36	85.9	
402	18.0	1499.7	14.30	85.9	
402	28.0	1497.7	14.27	88.1	
402	34.0	1498.8	14.27	89.2	
402	38.0	1499.7	14.27	90.3	
402	48.0	1499.6	14.15	90.9	
402	58.0	1494.7	12.66	93.2	
402	63.0	1493.3	12.21	94.6	
402	68.0	1491.9	11.79	95.1	
402	78.0	1489.6	11.00	97.7	
402	88.0	1488.3	10.55	98.2	
402	98.0	1488.3	10.45	93.7	

TABLE 1 (Cont.)

STATION: D-3      DEPTH: 1405 m  
 DATE: 9-11-69      TIME: 1830  
 LAT: 36°-42.0'      LONG: 121°-19.2'  
 WIND DIR: 315°      SPEED: 20  
 AIR TEMP(DRY): 58°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 315°-4

STA	Z	SO	VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)		
403	0,0	1501,0	14,80	68,5	
403	9,0	1500,9	14,78	68,5	
403	18,0	1500,8	14,67	68,5	
403	27,0	1500,8	14,62	70,4	
403	38,0	1500,9	13,59	75,1	
403	48,0	1494,3	12,52	86,6	
403	58,0	1491,6	11,71	88,3	
403	68,0	1490,5	11,39	89,1	
403	78,0	1489,4	10,95	89,5	
403	88,0	1489,1	10,79	89,8	
403	98,0	1488,2	10,48	90,0	

\* RELATIVE VALUES ONLY

STATION: E-1      DEPTH: 756 m  
 DATE: 9-11-69      TIME: 2015  
 LAT: 36°-46.6'      LONG: 121°-15.1'  
 WIND DIR: 000°      SPEED: 16  
 AIR TEMP(DRY): 58°      BARO: 29.80  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 315°-4

STA	Z	SO	VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)		
501	0,0	1500,3	14,62	70,9	
501	10,0	1500,5	14,59	70,0	
501	20,0	1500,2	14,46	70,3	
501	30,0	1500,3	14,43	73,5	
501	40,0	1498,5	13,80	80,7	
501	44,0	1495,4	12,82	85,4	
501	49,0	1494,1	12,35	87,1	
501	55,0	1492,1	11,85	87,9	
501	61,0	1490,5	11,32	88,7	
501	69,0	1490,0	11,14	88,6	
501	75,0	1489,2	10,91	88,6	
501	82,0	1488,9	10,77	86,9	
501	98,0	1488,2	10,50	87,6	

TABLE 1 (Cont.)

STATION: E-2      DEPTH: 366 m  
 DATE: 9-11-69      TIME: 2145  
 LAT: 36°-51.0'      LONG: 121°-10.9'  
 WIND DIR: 040°      SPEED: 8  
 AIR TEMP(DRY): 59°      BARO: 29.82  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
502	0.0	1500.5	14.67	72.7
502	10.0	1500.8	14.69	72.5
502	20.0	1500.8	14.68	74.8
502	28.0	1500.6	14.55	79.3
502	33.0	1500.7	14.53	80.0
502	43.0	1500.3	14.37	80.5
502	54.0	1492.9	12.14	86.2
502	63.0	1491.8	11.69	87.0
502	73.0	1490.3	11.21	86.1
502	84.0	1489.8	11.00	85.2
502	98.0	1489.4	10.78	85.4

RELATIVE VALUES ONLY

STATION: E-3      DEPTH: 139 m  
 DATE: 9-11-69      TIME: 2300  
 LAT: 36°-51.7'      LONG: 121°-09.9'  
 WIND DIR: 040°      SPEED: 8  
 AIR TEMP(DRY): 59°      BARO: 29.82  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
503	0.0	1500.5	14.66	73.1
503	9.0	1500.6	14.64	78.9
503	15.0	1500.6	14.60	79.6
503	25.0	1500.4	14.50	77.7
503	34.0	1499.7	14.23	70.9
503	39.0	1499.7	14.19	70.9
503	49.0	1498.5	13.79	78.1
503	59.0	1492.7	12.01	86.4

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: E-4		DEPTH: 90 m		
DATE: 10-11-69		TIME: 0045		
LAT: 36°-53.0'		LONG: 121°-08.2'		
WIND DIR: 300°		SPEED: 8		
AIR TEMP(DRY): 55°		BARO: 29.81		
CLOUD AMT: Clear		HEIGHT(FT): -		
SEA: -		SWELL: 300°-4		
STA	Z	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
504	0,0	1499,9	14,47	68,2
504	10,0	1500,0	14,44	69,2
504	20,0	1499,8	14,34	72,0
504	24,0	1499,5	14,22	73,5
504	30,0	1499,5	14,19	74,0
504	38,0	1498,9	13,95	75,7
504	48,0	1498,8	13,87	77,2
504	59,0	1497,4	13,22	79,7
504	68,0	1493,5	12,14	67,0
504	74,0	1493,1	11,98	69,8
504	79,0	1492,7	11,86	69,9

RELATIVE VALUES ONLY

STATION: E-5      DEPTH: 72 m  
 DATE: 10-11-69      TIME: 0200  
 LAT: 36°-54.7'      LONG: 121°-07.3'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 58°      BARO: 29.84  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z (M)	SO VEL* (Z+1) (C)	TEMP (C)	TRAN (%)
505	0,0	1500,1	14,53	69,6
505	4,0	1500,1	14,52	69,8
505	9,0	1500,2	14,51	67,8
505	18,0	1500,2	14,47	72,2
505	29,0	1499,9	14,30	74,7
505	39,0	1497,6	13,57	76,0
505	48,0	1496,2	13,04	68,5
505	53,0	1496,0	12,99	49,0

RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: E-6 DEPTH: 55 m  
 DATE: 10-11-69 TIME: 0330  
 LAT: 36°-55.4' LONG: 121°-06.2'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARO: 29.83  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 300°-4

STA	Z (M)	SO VEL (Z+1)	TEMP (C)	TRAN (%)
506	0.0	1500,2	14,56	62,0
506	5.0	1500,2	14,53	63,0
506	10.0	1500,1	14,50	65,0
506	14.0	1500,0	14,42	63,0
506	18.0	1499,1	14,12	67,9
506	29.0	1497,9	13,68	43,5
506	33.0	1497,9	13,66	47,4

RELATIVE VALUES ONLY

STATION: E-7 DEPTH: 35 m  
 DATE: 10-11-69 TIME: 0500  
 LAT: 36°-56.0' LONG: 121°-04.8'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARO: 29.83  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 300°-4

STA	Z (M)	SO VEL (Z+1)	TEMP (C)	TRAN (%)
507	0.0	1499,8	14,44	65,7
507	3.0	1499,9	14,44	64,8
507	7.0	1500,0	14,44	61,9
507	11.0	1500,0	14,43	62,5
507	16.0	1499,6	14,26	61,0
507	21.0	1499,1	14,12	55,7

RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: F-1      DEPTH: 36 m  
 DATE: 10-11-69      TIME: 1045  
 LAT: 36°-57.8'      LONG: 121°-10.0'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 60°      BARO: 29.84  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
601	0.0	1500.3	14.63	65.5
601	10.0	1500.2	14.55	66.4
601	21.0	1500.0	14.42	68.1
601	27.0	1499.7	14.27	59.6

\* RELATIVE VALUES ONLY

STATION: F-2      DEPTH: 36 m  
 DATE: 10-11-69      TIME: 1230  
 LAT: 37°-00.8'      LONG: 122°-14.4'  
 WIND DIR: 160°      SPEED: 8  
 AIR TEMP(DRY): 64°      BARO: 29.85  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 290°-3

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
602	1.0	1499.9	14.50	69.2
602	7.0	1499.7	14.39	68.1
602	12.0	1499.7	14.36	69.6
602	16.0	1499.5	14.27	66.0
602	21.0	1499.1	14.11	56.2
602	27.0	1499.1	14.09	51.7

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: F-3      DEPTH: 26 m  
 DATE: 10-11-69      TIME: 1330  
 LAT: 37°-04.5'      LONG: 122°-17.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°      BARO: 29.82  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 290°-3

STA	Z (M)	SO VEL (Z+1)	TEMP (C)	TRAN (%)
603	1.0	1499.0	14.20	56.8
603	7.0	1498.8	14.12	51.8
603	12.0	1498.6	14.02	35.0
603	17.0	1498.2	13.89	34.0

\* RELATIVE VALUES ONLY

STATION: G-1      DEPTH: 55 m  
 DATE: 10-11-69      TIME: 1430  
 LAT: 37°-03.0'      LONG: 122°-19.4'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°      BARO: 29.82  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 290°-3

STA	Z (M)	SO VEL (Z+1)	TEMP (C)	TRAN (%)
701	1.0	1500.6	14.66	66.9
701	6.0	1500.1	14.53	65.9
701	12.0	1499.5	14.31	66.6
701	15.0	1498.6	14.01	70.3
701	21.0	1498.4	13.92	59.2
701	26.0	1498.5	13.89	54.5
701	32.0	1498.6	13.89	54.2
701	40.0	1498.7	13.90	52.7

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: G-2      DEPTH: 70 m  
 DATE: 10-11-69    TIME: 1545  
 LAT: 37°-02,0'    LONG: 122°-20.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°    BARO: 29.82  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
702	2.0	1501.3	14.95	66.2
702	10.0	1500.0	14.48	65.6
702	22.0	1497.7	13.68	55.0
702	26.0	1497.7	13.64	51.3
702	32.0	1497.7	13.62	49.7
702	41.0	1497.8	13.63	48.7
702	52.0	1497.9	13.58	47.8

\* RELATIVE VALUES ONLY

STATION: G-3      DEPTH: 95 m  
 DATE: 10-11-69    TIME: 1700  
 LAT: 37°-01.8'    LONG: 122°-22.2'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°    BARO: 29.82  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
703	0.0	1501.6	14.99	66.4
703	11.0	1500.5	14.63	64.5
703	21.0	1500.4	14.53	66.2
703	31.0	1499.7	14.31	77.8
703	37.0	1498.9	14.10	78.0
703	42.0	1498.4	13.86	75.8
703	51.0	1498.1	13.65	77.9
703	61.0	1497.5	13.42	53.9
703	69.0	1495.2	12.69	53.0
703	80.0	1493.6	12.15	50.9

RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: G-4      DEPTH: 123 m  
 DATE: 10-11-69    TIME: 1900  
 LAT: 37°-00.8'    LONG: 122°-23.5'  
 WIND DIR: 315°    SPEED: 12  
 AIR TEMP(DRY): 58°    BARO: 29.84  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-4

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
704	0.0	1501.3	14.91	69.9
704	10.0	1501.0	14.77	69.9
704	20.0	1500.5	14.57	73.6
704	31.0	1500.5	14.52	76.0
704	40.0	1500.3	14.40	80.9
704	49.0	1496.3	13.35	83.7
704	59.0	1492.7	11.98	85.0
704	70.0	1492.7	11.92	69.0
704	79.0	1492.5	11.92	68.0
704	80.0	1492.1	11.66	62.6
704	99.0	1492.2	11.62	57.4

\* RELATIVE VALUES ONLY

STATION: G-5      DEPTH: 406 m  
 DATE: 10-11-69    TIME: 2115  
 LAT: 36°-59.4'    LONG: 122°-25.0'  
 WIND DIR: 315°    SPEED: 12  
 AIR TEMP(DRY): 58°    BARO: 29.84  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 315°-4

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
705	0.0	1500.7	14.73	72.2
705	9.0	1500.7	14.68	73.8
705	20.0	1500.5	14.57	73.8
705	31.0	1500.7	14.55	76.8
705	40.0	1493.4	12.42	86.5
705	50.0	1491.5	11.71	87.2
705	60.0	1490.2	11.26	85.4
705	70.0	1490.1	11.16	79.2
705	80.0	1489.7	11.01	60.1
705	90.0	1489.6	10.91	77.8
705	100.0	1489.5	10.81	64.5

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: G-6      DEPTH: 360 m  
 DATE: 10-11-69    TIME: 2330  
 LAT: 36°-57.5'    LONG: 122°-27.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 54°    BARO: 29.85  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-3

STA	Z	SD	VEL*	TEMP	TRAN
	(M)	(7+1)	(C)	(%)	
706	0.0	1500.5	14.68	71.0	
706	10.0	1500.4	14.59	71.2	
706	20.0	1500.5	14.56	72.0	
706	29.0	1498.9	14.10	81.2	
706	40.0	1492.7	12.17	87.8	
706	49.0	1491.0	11.53	87.6	
706	50.0	1489.9	11.17	87.0	
706	70.0	1489.2	10.91	85.6	
706	79.0	1489.0	10.79	85.8	
706	90.0	1488.9	10.73	82.9	
706	100.0	1488.6	10.56	72.5	

\* RELATIVE VALUES ONLY

STATION: G-7      DEPTH: 1325 m  
 DATE: 11-11-69    TIME: 0130  
 LAT: 36°-54.6'    LONG: 122°-33.2'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 58°    BARO: 29.90  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-3

STA	Z	SD	VEL*	TEMP	TRAN
	(M)	(7+1)	(C)	(%)	
707	0.0	1499.7	14.43	72.0	
707	9.0	1499.3	14.24	72.2	
707	19.0	1499.3	14.20	74.1	
707	29.0	1498.7	13.86	79.9	
707	36.0	1496.7	13.32	82.6	
707	41.0	1493.0	12.23	87.1	
707	45.0	1491.0	11.60	87.4	
707	54.0	1490.5	11.34	86.9	
707	66.0	1488.9	10.92	83.8	
707	76.0	1488.5	10.70	88.8	
707	85.0	1488.1	10.49	88.2	
707	100.0	1487.5	10.23	89.2	

TABLE 1 (Cont.)

STATION: H-1	DEPTH: 1080 m	STATION: H-2	DEPTH: 634 m
DATE: 11-11-69	TIME: 0530	DATE: 11-11-69	TIME: 0745
LAT: 37°-01.3'	LONG: 122°-46.5'	LAT: 37°-07.5'	LONG: 122°-57.3'
WIND DIR: 300°	SPEED: 10	WIND DIR: Var.	SPEED: 0-2
AIR TEMP(DRY): 58°	BARO: 29.90	AIR TEMP(DRY): 60°	BARO: 29.96
CLOUD AMT: Clear	HEIGHT(FT): -	CLOUD AMT: Clear	HEIGHT(FT): -
SEA: -	SWELL: 315°-3	SEA: -	SWELL: 315°-3

STA	Z	SO VFL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
801	0.0	1500.5	14.79	73.1
801	10.0	1500.7	14.77	71.0
801	21.0	1500.3	14.55	71.2
801	31.0	1500.0	14.38	76.6
801	36.0	1499.5	14.20	80.2
801	40.0	1497.1	13.44	83.5
801	46.0	1496.0	13.10	85.1
801	50.0	1494.8	12.74	86.5
801	60.0	1491.5	11.67	88.5
801	71.0	1488.8	10.92	88.9
801	85.0	1437.8	10.48	89.2
801	99.0	1486.7	10.07	89.8

STA	Z	SO VFL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
802	0.0	1500.8	14.83	66.9
802	9.0	1500.8	14.76	66.9
802	19.0	1500.9	14.73	67.8
802	28.0	1501.2	14.76	73.9
802	35.0	1501.2	14.73	75.8
802	39.0	1501.1	14.70	77.1
802	49.0	1497.5	13.43	81.2
802	59.0	1492.7	12.05	86.2
802	64.0	1492.3	11.92	86.4
802	78.0	1488.7	10.79	87.2
802	99.0	1486.5	10.01	87.3

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: I-1      DEPTH: 100 m  
 DATE: 11-11-69      TIME: 1100  
 LAT: 37°-11.1'      LONG: 122°-36.8'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 61°      BARO: 29.97  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 315°-3

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
901	0,0	1500,7	14,78	65,5
901	5,0	1500,4	14,62	61,0
901	10,0	1500,1	14,51	59,8
901	20,0	1499,7	14,31	61,2
901	30,0	1499,2	14,14	65,3
901	40,0	1496,5	13,24	52,2
901	45,0	1496,0	13,04	42,0
901	50,0	1496,0	13,02	41,6
901	60,0	1495,4	12,78	41,9
901	71,0	1494,9	12,61	47,5
901	81,0	1493,7	12,19	48,6
901	86,0	1493,2	12,01	47,2

STATION: I-2      DEPTH: 92 m  
 DATE: 11-11-70      TIME: 1215  
 LAT: 37°-11.1'      LONG: 122°-34.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 71°      BARO: 29.97  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 315°-3

STA	Z	SO VEL	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
902	1,0	1501,7	15,09	69,3
902	10,0	1500,4	14,60	69,7
902	20,0	1500,2	14,49	77,2
902	25,0	1499,4	14,20	81,8
902	30,0	1497,8	13,72	84,5
902	40,0	1496,1	13,12	73,4
902	50,0	1495,8	12,96	57,6
902	59,0	1495,6	12,85	50,4
902	70,0	1495,6	12,79	53,2
902	75,0	1495,6	12,77	55,7

RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: I-3						STATION: I-4					
DATE: 11-11-69			TIME: 2015			DATE: 11-11-69			TIME: 2130		
LAT: 37°-11.1'			LONG: 122°-34.0'			LAT: 37°-11.1'			LONG: 122°-32.4'		
WIND DIR: Var.			SPEED: 0-2			WIND DIR: Var.			SPEED: 0-2		
AIR TEMP(DRY): 58°			BARO: 29.96			AIR TEMP(DRY): 56°			BARO: 29.99		
CLOUD AMT: Clear			HEIGHT(FT): -			CLOUD AMT: Clear			HEIGHT(FT): -		
SEA: -			SWELL: 300°-3			SEA: -			SWELL: 300°-3		
STA	Z	SD	VEL#	TEMP	TRAN	STA	Z	SD	VEL#	TEMP	TRAN
	(M)	(7+1)	(C)	(%)			(M)	(7+1)	(C)	(%)	
903	0.0	1500.3	14.59	69.3		904	0.0	1501.2	14.95	72.2	
903	10.0	1500.2	14.53	70.2		904	10.0	1500.3	14.54	70.7	
903	20.0	1499.8	14.34	78.3		904	15.0	1500.0	14.44	72.9	
903	25.0	1499.2	14.14	78.5		904	21.0	1499.8	14.35	79.9	
903	35.0	1496.6	13.29	78.6		904	24.0	1498.7	14.05	83.0	
903	46.0	1494.0	12.49	70.4		904	29.0	1497.4	13.54	58.2	
903	50.0	1493.1	12.13	65.1		904	41.0	1496.6	13.26	64.2	
903	56.0	1492.8	12.05	61.3		904	51.0	1494.5	12.61	67.9	
903	60.0	1493.0	12.04	54.4		904	62.0	1492.8	12.02	61.8	
903	65.0	1492.7	11.95	45.6		904	69.0	1492.9	11.95	47.6	
903	71.0	1492.4	11.84	44.2		904	74.0	1492.6	11.86	45.0	
903	76.0	1492.4	11.78	43.6							
RELATIVE VALUES ONLY											

RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: I-5 DEPTH: 84 m  
 DATE: 11-11-69 TIME: 2300  
 LAT: 37°-11.0' LONG: 122°-31.0'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 56° BARO: 29.99  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 300°-3

STA	Z	SO VEL	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
905	0,0	1500,7	14,69	78,2
905	4,0	1500,5	14,63	74,9
905	10,0	1500,1	14,49	81,1
905	20,0	1499,8	14,34	83,0
905	30,0	1499,7	14,27	85,1
905	40,0	1499,1	14,06	83,8
905	50,0	1497,5	13,52	54,2
905	60,0	1496,5	13,12	55,0
905	70,0	1494,8	12,56	56,2

\* RELATIVE VALUES ONLY

STATION: I-6 DEPTH: 77 m  
 DATE: 12-11-69 TIME: 0430  
 LAT: 37°-11.2' LONG: 122°-29.7'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARO: 30.02  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 290°-2

STA	Z	SO VEL	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
906	1,0	1500,4	14,64	67,9
906	10,0	1500,3	14,57	70,2
906	19,0	1499,8	14,38	71,5
906	29,0	1499,1	14,09	65,4
906	39,0	1498,7	13,91	49,3
906	49,0	1498,7	13,86	53,3
906	59,0	1498,3	13,68	55,5

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: I-7 DEPTH: 88 m  
 DATE: 12-11-69 TIME: 0545  
 LAT: 37°-11.3' LONG: 122°-28.0'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 57° BARO: 30.04  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 308°-2

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
907	0.0	1500.1	14.53	73.2
907	4.0	1500.2	14.53	73.6
907	10.0	1500.2	14.53	73.7
907	19.0	1500.2	14.46	78.0
907	29.0	1499.6	14.26	79.2
907	40.0	1499.4	14.10	74.7
907	49.0	1499.0	13.94	61.5
907	60.0	1499.1	13.93	55.6

\* RELATIVE VALUES ONLY

STATION: I-8 DEPTH: 55 m  
 DATE: 12-11-69 TIME: 0700  
 LAT: 37°-11.1' LONG: 122°-26.5'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 60° BARO: 30.06  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: -

STA	Z (M)	SO VEL* (Z+1)	TEMP (C)	TRAN (%)
908	0.0	1499.9	14.48	69.0
908	5.0	1499.9	14.44	69.0
908	10.0	1499.8	14.39	71.4
908	20.0	1499.7	14.29	65.1
908	25.0	1499.7	14.27	63.3
908	30.0	1499.7	14.25	60.5
908	40.0	1499.8	14.22	55.1

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: I-9      DEPTH: 36 m  
 DATE: 12-11-69      TIME: 0810  
 LAT: 37°-11.2'      LONG: 122°-25.1'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 60°      BARO: 30.06  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO	VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)	
909	0.0	1499.9	14.47	68.3	
909	11.0	1499.5	14.29	64.0	
909	15.0	1499.5	14.29	64.8	
909	25.0	1499.7	14.29	64.4	

\* RELATIVE VALUES ONLY

STATION: J-1      DEPTH: 32 m  
 DATE: 12-11-69      TIME: 0915  
 LAT: 37°-16.0'      LONG: 122°-27.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 71°      BARO: 30.10  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO	VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)	
1001	0.0	1498.1	13.91	54.3	
1001	10.0	1498.2	13.86	50.6	
1001	16.0	1498.2	13.86	48.9	
1001	20.0	1498.2	13.85	44.4	
1001	22.0	1498.3	13.84	32.9	

\* RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: J-2      DEPTH: 38 m  
 DATE: 12-11-69      TIME: 1025  
 LAT: 37° -21.5'      LONG: 122° -29.4  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 71°      BARO: 30.10  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO	VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)	
1002	0.0	1498.5	14.03	79.2	
1002	4.0	1498.3	13.95	78.4	
1002	15.0	1498.3	13.90	75.1	
1002	21.0	1498.3	13.85	65.9	
1002	30.0	1498.2	13.79	60.7	

\* RELATIVE VALUES ONLY

STATION: J-3      DEPTH: 40 m  
 DATE: 12-11-69      TIME: 1210  
 LAT: 37° -26.5'      LONG: 122° -31.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 61°      BARO: 30.10  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO	VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)	
1003	0.0	1500.7	14.58	79.2	
1003	9.0	1498.4	13.95	77.4	
1003	20.0	1498.4	13.91	76.5	
1003	29.0	1498.1	13.75	66.5	

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: J-4      DEPTH: 37 m  
 DATE: 12-11-69    TIME: 1320  
 LAT: 37°-32.1'    LONG: 122°-33.4'  
 WIND DIR: Var.    SPEED: 0-2  
 AIR TEMP(DRY): 64°    BARO: 30.10  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(7+1)	(C)	(%)
1004	0.0	1499.1	14.22	29.5
1004	10.0	1497.4	13.69	31.5
1004	19.0	1497.7	13.63	33.6
1004	29.0	1497.8	13.65	41.7

\* RELATIVE VALUES ONLY

STATION: K-1      DEPTH: 45 m  
 DATE: 12-11-69    TIME: 1410  
 LAT: 37°-32.0'    LONG: 122°-34.7'  
 WIND DIR: Var.    SPEED: 0-2  
 AIR TEMP(DRY): 64°    BARO: 30.10  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(7+1)	(C)	(%)
1101	0.0	1499.8	14.44	77.2
1101	10.0	1498.3	13.93	72.9
1101	15.0	1498.3	13.92	76.0
1101	19.0	1498.5	13.92	77.3
1101	30.0	1498.1	13.76	56.6
1101	34.0	1497.9	13.68	50.9

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: K-2      DEPTH: 47 m  
 DATE: 12-11-69    TIME: 1445  
 LAT: 37°-32.2'    LONG: 122°-35.8'  
 WIND DIR: Var.    SPEED: 0-2  
 AIR TEMP(DRY): 64°    BARO: 30.10  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
1102	0.0	1500.2	14.55	78.2
1102	10.0	1498.4	13.97	78.2
1102	20.0	1498.4	13.93	81.5
1102	30.0	1498.5	13.88	79.9
1102	34.0	1498.3	13.80	81.0
1102	40.0	1497.7	13.61	67.6

\* RELATIVE VALUES ONLY

STATION: K-3      DEPTH: 50 m  
 DATE: 12-11-69    TIME: 1530  
 LAT: 37°-32.2'    LONG: 122°-37.2'  
 WIND DIR: Var.    SPEED: 0-2  
 AIR TEMP(DRY): 64°    BARO: 30.08  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
1103	0.0	1498.9	14.16	81.4
1103	10.0	1499.3	14.21	81.9
1103	19.0	1498.5	13.93	70.7
1103	29.0	1498.3	13.87	78.9
1103	30.0	1497.8	13.60	76.7

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: K-4      DEPTH: 54 m  
 DATE: 12-11-69      TIME: 1620  
 LAT: 37°-32.1'      LONG: 122°-38.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 64°      BARO: 30.08  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL	TEMP	TRAN
	(M)	(7+1)	(C)	(%)
1104	0.0	1500.7	14.68	77.4
1104	9.0	1498.7	14.04	77.6
1104	19.0	1498.7	13.98	78.7
1104	29.0	1498.6	13.91	80.6
1104	39.0	1498.3	13.79	78.5
1104	44.0	1497.6	13.55	61.5

\* RELATIVE VALUES ONLY

STATION: K-5      DEPTH: 55 m  
 DATE: 12-11-69      TIME: 1715  
 LAT: 37°-32.0'      LONG: 122°-39.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°      BARO: 30.08  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL	TEMP	TRAN
	(M)	(7+1)	(C)	(%)
1105	0.0	1499.4	14.27	79.2
1105	4.0	1498.7	14.08	79.7
1105	10.0	1498.6	14.02	81.7
1105	20.0	1498.4	13.91	82.2
1105	30.0	1498.4	13.86	85.3
1105	39.0	1497.2	13.46	60.7

\* RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: K-6      DEPTH: 70 m  
 DATE: 12-11-69    TIME: 1900  
 LAT: 37°-30.8'    LONG: 122°-43.7'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 62°    BARO: 30.08  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
1106	1.0	1499.0	14.19	65.3
1106	10.0	1498.7	14.04	65.3
1106	20.0	1498.3	13.88	67.7
1106	30.0	1498.1	13.75	68.2
1106	40.0	1497.8	13.60	68.2
1106	50.0	1497.1	13.33	60.2
1106	55.0	1496.7	13.19	51.7

\* RELATIVE VALUES ONLY

STATION: K-8      DEPTH: 78 m  
 DATE: 12-11-69    TIME: 2030  
 LAT: 37°-32.2'    LONG: 122°-48.6'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 60°    BARO: 30.08  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: 300°-2

STA	Z	SO VEL*	TEMP	TRAN
(M)	(Z+1)	(C)	(%)	
1108	1.0	1500.2	14.56	61.2
1108	10.0	1499.5	14.32	63.4
1108	20.0	1498.5	13.97	76.4
1108	31.0	1496.6	13.32	81.4
1108	41.0	1495.4	12.88	76.7
1108	51.0	1494.1	12.43	55.7
1108	61.0	1493.4	12.15	64.3
1108	69.0	1493.2	12.04	62.7
1108	74.0	1492.9	11.96	61.2

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: K-9	DEPTH: 90 m	STATION: K-10	DEPTH: 108 m						
DATE: 12-11-69	TIME: 2145	DATE: 12-11-69	TIME: 2300						
LAT: 37°-32.3' LONG: 122°-52.5'		LAT: 37°-32.2' LONG: 122°-56.0'							
WIND DIR: 000°	SPEED: 8	WIND DIR: 000°	SPEED: 8						
AIR TEMP(DRY): 57°	BARO: 30.10	AIR TEMP(DRY): 57°	BARO: 30.10						
CLOUD AMT: Clear	HEIGHT(FT): -	CLOUD AMT: Clear	HEIGHT(FT): -						
SEA: -	SWELL: 300°-2	SEA: -	SWELL: 300°-2						
STA	Z	SO VEL*	TEMP	TRAN	STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)		(M)	(Z+1)	(C)	(%)
11109	0.0	1501.3	14.91	61.3	11110	0.0	1499.3	14.23	62.7
11109	11.0	1500.1	14.48	65.2	11110	11.0	1499.3	14.25	62.8
11109	21.0	1499.3	14.21	72.6	11110	19.0	1499.3	14.13	71.2
11109	30.0	1494.2	12.63	79.1	11110	29.0	1496.9	13.27	81.9
11109	40.0	1493.1	12.22	67.4	11110	40.0	1492.1	11.92	74.5
11109	49.0	1493.1	12.15	66.4	11110	49.0	1490.7	11.44	62.2
11109	58.0	1493.1	12.06	61.0	11110	54.0	1490.7	11.41	61.8
11109	69.0	1492.6	11.91	61.0	11110	59.0	1490.8	11.39	61.6
11109	73.0	1492.3	11.79	59.6	11110	68.0	1490.7	11.29	59.9
* RELATIVE VALUES ONLY					11110	79.0	1490.6	11.25	59.3
					11110	87.0	1490.6	11.16	59.2

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: K-11 DEPTH: 1220 m  
 DATE: 13-11-69 TIME: 0110  
 LAT: 37°-11.1' LONG: 123°-09.3'  
 WIND DIR: Var. SPEED: 0-2  
 AIR TEMP(DRY): 58° BARC: 30.10  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: 300°-2

STA	Z (M)	SD VEL (Z+1)	TEMP (C)	TRAN (%)
1111	0.0	1500.9	14.86	70.4
1111	10.0	1500.9	14.87	71.9
1111	20.0	1501.1	14.86	72.0
1111	30.0	1501.2	14.85	72.4
1111	39.0	1499.5	14.73	80.3
1111	45.0	1497.9	13.59	82.9
1111	50.0	1494.7	12.74	85.0
1111	55.0	1491.9	11.87	85.5
1111	65.0	1491.9	11.78	88.6
1111	74.0	1488.4	10.79	90.1
1111	85.0	1490.1	11.13	90.7
1111	100.0	1487.9	10.39	91.8

\* RELATIVE VALUES ONLY

STATION: L-1 DEPTH: 1494 m  
 DATE: 13-11-69 TIME: 0245  
 LAT: 37°-36.8' LONG: 123°-15.5'  
 WIND DIR: 000° SPEED: 7  
 AIR TEMP(DRY): 58° BARC: 30.10  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: -

STA	Z (M)	SD VEL (Z+1)	TEMP (C)	TRAN (%)
1201	0.0	1500.9	14.91	69.1
1201	10.0	1500.8	14.80	69.9
1201	21.0	1501.0	14.76	68.7
1201	29.0	1501.5	14.83	77.0
1201	34.0	1501.7	14.85	76.8
1201	45.0	1499.7	14.23	80.2
1201	49.0	1495.3	12.95	82.7
1201	60.0	1493.2	12.23	85.8
1201	69.0	1490.0	11.17	88.9
1201	79.0	1488.4	10.94	88.9
1201	90.0	1486.5	10.08	85.8
1201	100.0	1484.7	9.52	90.5

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: L-2		DEPTH: 185 m	
DATE: 13-11-69		TIME: 0430	
LAT: 37°-42.5'		LONG: 123°-08.4'	
WIND DIR: 000°		SPEED: 7	
AIR TEMP(DRY): 58°		BARO: 30.10	
CLOUD AMT: Clear		HEIGHT(FT): -	
SEA: -		SWELL: -	
STA	Z (M)	SD VEL* TEMP (Z+1) (C)	TRAN (%)
1202	0.0	1499.7	14.42 69.2
1202	10.0	1499.5	14.33 70.2
1202	20.0	1499.1	14.15 75.3
1202	25.0	1498.3	13.87 77.6
1202	30.0	1494.9	12.73 81.7
1202	35.0	1493.7	12.40 81.7
1202	45.0	1492.0	12.13 78.2
1202	54.0	1491.6	11.67 64.6
1202	59.0	1491.2	11.53 62.5
1202	69.0	1491.0	11.71 53.4
1202	74.0	1490.9	11.38 52.2
1202	84.0	1491.1	11.37 51.7
1202	95.0	1490.8	11.22 52.0

STATION: L-3      DEPTH: 70 m  
 DATE: 13-11-69      TIME: 0645  
 LAT: 37°-47.7'      LONG: 123°-00.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 58°      BARO: 30.10  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z (M)	SD VEL* TEMP (Z+1) (C)	TRAN (%)
1203	0.0	1500.0	14.59 62.5
1203	10.0	1499.8	14.40 64.2
1203	19.0	1499.0	14.09 70.0
1203	25.0	1498.2	13.85 74.6
1203	30.0	1496.6	13.31 75.2
1203	40.0	1496.7	13.30 74.4
1203	50.0	1495.6	12.86 71.4
1203	59.0	1493.5	12.20 67.0

\* RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: L-4		DEPTH: 56 m		
DATE: 13-11-69		TIME: 0825		
LAT: 37°-53.0'		LONG: 122°-53.2'		
WIND DIR: Var.		SPEED: 0-2		
AIR TEMP(DRY): 58°		BARO: 30.10		
CLOUD AMT: Clear		HEIGHT(FT): -		
SEA: -		SWELL: -		
STA	Z	SO VEL* (M)	TEMP (C)	TRAN (%)
1204	0.0	1499.5	14.37	63.0
1204	10.0	1499.5	14.29	63.7
1204	20.0	1499.5	14.22	68.8
1204	29.0	1497.7	13.67	75.2
1204	35.0	1497.7	13.61	75.5
1204	39.0	1497.7	13.58	73.3
1204	44.0	1497.2	13.41	52.0
* RELATIVE VALUES ONLY				

STATION: M-1      DEPTH: 44 m  
 DATE: 13-11-69      TIME: 0945  
 LAT: 37°-53.0'      LONG: 122°-48.7'  
 WIND DIR: 100°      SPEED: 8  
 AIR TEMP(DRY): 64°      BARO: 30.10  
 CLOUD AMT: Clear      HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO VEL* (M)	TEMP (C)	TRAN (%)
1301	0.0	1499.4	14.41	63.6
1301	5.0	1499.1	14.28	62.3
1301	9.0	1499.2	14.25	62.8
1301	13.0	1499.4	14.23	63.7
1301	19.0	1499.1	14.14	71.5
1301	24.0	1499.8	14.00	74.7
1301	28.0	1498.0	13.76	79.2
1301	34.0	1497.9	13.67	75.0

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: M-2 DEPTH: 48 m  
 DATE: 13-11-70 TIME: 1130  
 LAT: 37°-49.4' LONG: 122°-49.0'  
 WIND DIR: 090° SPEED: 22  
 AIR TEMP(DRY): 64° BARO: 30.10  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: -

STA	Z (M)	SO VEL+ (Z+1)	TEMP (C)	TRAN (%)
1302	0.0	1499.6	14.40	74.7
1302	10.0	1499.2	14.19	73.3
1302	18.0	1497.3	13.90	77.8
1302	27.0	1497.6	13.61	57.7
1302	38.0	1497.6	13.57	56.4

\* RELATIVE VALUES ONLY

STATION: M-3 DEPTH: 43 m  
 DATE: 13-11-69 TIME: 1420  
 LAT: 37°-46.4' LONG: 122°-46.4'  
 WIND DIR: 130° SPEED: 10  
 AIR TEMP(DRY): 64° BARO: 30.09  
 CLOUD AMT: Clear HEIGHT(FT): -  
 SEA: - SWELL: -

STA	Z (M)	SO VEL+ (Z+1)	TEMP (C)	TRAN (%)
1303	1.0	1499.8	14.41	67.2
1303	6.0	1499.6	14.37	64.9
1303	12.0	1499.2	14.24	67.6
1303	16.0	1498.9	14.09	70.9
1303	21.0	1498.8	14.04	72.6
1303	25.0	1498.5	13.92	73.2
1303	31.0	1498.3	13.83	73.8

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: M-4					DEPTH: 40 m				
DATE: 13-11-70					TIME: 1525				
LAT: 37°-43.5'					LONG: 122°-44.4'				
WIND DIR: Var.					SPEED: 0-2				
AIR TEMP(DRY): 62°					BARO: 30.06				
CLOUD AMT: Clear					HEIGHT(FT): -				
SEA: -					SWELL: -				
STA	Z	SO VFL*	TEMP	TRAN	STA	Z	SO VFL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)		(M)	(Z+1)	(C)	(%)
1304	1.0	1499.1	14.28	74.6	1305	0.0	1499.7	14.44	69.7
1304	6.0	1498.7	14.12	76.1	1305	5.0	1499.0	14.68	67.1
1304	10.0	1498.4	13.94	77.8	1305	10.0	1498.4	13.97	69.8
1304	15.0	1497.9	13.79	66.3	1305	14.0	1498.3	13.91	76.6
1304	20.0	1497.8	13.74	65.3	1305	19.0	1497.7	13.75	74.7
1304	25.0	1497.8	13.67	60.7	1305	25.0	1497.0	13.47	66.3
1304	30.0	1497.3	13.52	57.5	1305	30.0	1496.6	13.27	60.9

\* RELATIVE VALUES ONLY

\* RELATIVE VALUES ONLY

TABLE 1 (Cont.)

STATION: M-6      DEPTH: 36 m  
 DATE: 13-11-69    TIME: 1745  
 LAT: 37°-37.8    LONG: 122°-40'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 60°    BARO: 30.08  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
1306	0.0	1499.9	14.50	73.3
1306	9.0	1498.9	14.14	67.9
1306	20.0	1498.5	13.93	81.1
1306	25.0	1497.7	13.75	71.8
1306	28.0	1497.7	13.65	67.5

\* RELATIVE VALUES ONLY

STATION: M-7      DEPTH: 32 m  
 DATE: 13-11-69    TIME: 1900  
 LAT: 37°-37.4'    LONG: 122°-36.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 60°    BARO: 30.08  
 CLOUD AMT: Clear    HEIGHT(FT): -  
 SEA: -      SWELL: -

STA	Z	SO VEL*	TEMP	TRAN
	(M)	(Z+1)	(C)	(%)
1307	0.0	1499.3	14.43	70.6
1307	10.0	1499.4	14.29	74.6
1307	15.0	1499.2	14.17	76.1
1307	20.0	1498.3	13.89	75.9
1307	24.0	1498.1	13.81	75.5

\* RELATIVE VALUES ONLY



TABLE 1 (Cont.)

STATION: K-6a      DEPTH: 68 m  
 DATE: 13-11-69      TIME: 2150  
 LAT: 37°-30.7'      LONG: 122°-43.6'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 58°      BARO: 30.06  
 CLOUD AMT: 7      HEIGHT(FT): 2000  
 SEA: -      SWELL: -

STA	Z (M)	SD VEL* (Z+1)	TEMP (C)	TRAN (%)
1106	0.0	1499.5	14.38	69.9
1106	5.0	1500.0	14.48	69.1
1106	10.0	1499.3	14.27	64.4
1106	15.0	1498.8	14.07	70.3
1106	20.0	1497.8	13.77	72.9
1106	25.0	1497.4	13.59	71.6
1106	31.0	1497.3	13.52	69.4
1106	40.0	1496.6	13.25	64.9
1106	51.0	1496.6	13.19	55.2
1106	55.0	1496.7	13.19	54.0

\* RELATIVE VALUES ONLY

STATION: K-7      DEPTH: 66 m  
 DATE: 13-11-69      TIME: 2030  
 LAT: 37°-32.2'      LONG: 122°-44.5'  
 WIND DIR: Var.      SPEED: 0-2  
 AIR TEMP(DRY): 59°      BARO: 30.08  
 CLOUD AMT: 10      HEIGHT(FT): 2000  
 SEA: -      SWELL: -

STA	Z (M)	SD VEL* (Z+1)	TEMP (C)	TRAN (%)
1107	0.0	1500.2	14.54	67.3
1107	10.0	1499.9	14.45	67.3
1107	20.0	1499.4	14.22	66.9
1107	25.0	1499.4	14.20	66.6
1107	29.0	1499.3	14.13	67.4
1107	40.0	1497.5	13.56	68.7
1107	50.0	1496.5	13.18	56.8
1107	54.0	1496.6	13.16	56.8

\* RELATIVE VALUES ONLY

TABLE 2

Coulter Particle Count (2ml sample) and Oxygen Content

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height															
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100					
7 Nov. 1300	0 5 10 20 30 40 50 60		2474 1941 2742 1904 3078 1840 1505 1925	STATION A-1															
				899	727	381	148	90	80	24	53	8	6	28					
				210	746	464	211	117	48	23	38	6	0	2					
				1195	626	567	116	77	47	30	14	0	31	3					
				676	631	86	262	146	44	9	4	13	12	3					
				2076	560	242	86	43	19	7	16	0	4	6					
				743	570	313	102	19	39	5	26	3	0	2					
				147	734	375	98	61	30	12	13	9	2	4					
841	610	307	69	28	31	16	4	2	4	2									
7 Nov. 1700	0 10 20 35 45 55	5.7744 5.8411 5.7971 5.7658 5.5318 4.5664	2338 5212 3004 1344 1556 1376	STATION A-2															
				872	677	400	179	58	52	35	15	9	17	3					
				2095	1264	802	560	209	99	18	54	36	41	0					
				1363	857	418	190	64	0	39	28	9	6	6					
				510	381	281	46	53	12	14	22	3	8	0					
				855	376	205	42	31	14	6	6	7	2	5					
				450	507	228	73	0	47	13	6	23	12	2					

TABLE 2(Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height																
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100						
7 Nov. 1930				<u>STATION A-3</u>																
	0	5.8261	3711	1449	1159	663	164	119	31	34	32	15	17	11						
	20	5.6303	2343	759	850	381	214	45	23	24	15	13	4	0						
	30	5.6781	2029	1133	434	319	59	35	0	4	19	8	9	0						
	40	5.6781	2479	1399	665	236	87	34	11	22	0	14	0	0						
	45	5.6498	1115	387	381	214	59	4	20	5	10	10	7	2						
	50	5.6337	1834	845	480	302	100	13	26	12	18	12	2	3						
	55	5.6519	1952	937	504	320	62	35	19	13	20	15	2	7						
	70	5.6576	1520	845	334	207	66	17	6	9	11	10	9							
7 Nov. 2130				<u>STATION A-4</u>																
	0	5.6501	2162	1036	519	374	108	39	27	8	10	8	16							
	10	5.7280	1278	480	414	219	59	27	9	22	7	11	5	1						
	35	5.4513	1686	774	517	214	87	15	35	16	5	5	5							
	45	5.3938	1466	720	398	171	63	52		12	14	14	5	5						
	65	5.0881	1304	705	329	160	46	21	9	2	5		14	2						
	70	5.3078	964	520	215	126	42	25	4	2	8	7		6						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION A-5</u>														
7 Nov. 2330	0	5.6748	916	259	305	212	57	28	20	4	8			
	30	-----	1865	911	527	243	69	48	18	19	9		8	5
	50	5.3613	1534	658	537	189	79	13	26	10				
	60	5.4509	1118	232	472	269	51	34	22	2	11	11	1	1
	70	5.3531	3330	2723	315	142	60	30	5	22	10	5	7	
	95	5.1036	8139	6179	1325	392	137	46	26	5	1	17	17	2
	100	4.5847	8944	6148	1422	989	186	100	44	12	10	8	7	
<u>STATION A-6</u>														
8 Nov. 0100	0	5.7055	1302	853	244	107	27	13	17	10	7	3	1	13
	16	5.4967	2521	1839	387	156	57	21	20					
	32	5.3762	1996	1402	313	147	57	27	15					
	41	5.1718	2050	1512	291	111	69	12	25	3	13	3	2	3
	55	5.2514	1560	901	342	213	25	23	25					
	70	5.5813	2054	1395	356	149	66	11	16	2	30			
	80	5.3306	1970	1431	283	124	66	17	11	5	6	14		
95	5.2341	4226	2540	1010	419	138	32	39	15	6	10	9		



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
8 Nov. 0330				STATION A-7										
	0	5.7017	2157	1558	282	181	60	2	23	11	13			
	5	5.6250	1456	970	300	73	48	15	16	3				
	20	5.5700	1826	1308	257	123	63	9	18	17	7			
	35	5.4011	1992	1459	246	162	50	23	21	4	4	6	6	1
	50	5.3413	988	550	177	48	55	21	17					
	60	5.3163	470	282	62	64	16	21	4					
	75	5.2044	1437	994	217	137	35	21						
	80	5.2265	1485	1090	207	102	40	13	6	9				
	95	5.1567	1931	1356	132	51	20	7	8					
	105	5.1546	3383	2626	467	181	41	24	6	11	5	10		
8 Nov. 0530				STATION A-8										
	0	5.5674	791	346	211	122	21	39	7	14	5	5	8	
	20	5.6758	1366	892	285	86	27	32	20					
	35	5.2899	1572	1063	246	146	43	36	3	13	2	4	6	7
	40	5.3435	894	501	210	96	35	7	19					
	45	5.3200	952	579	155	133	46	1	10	8	4			
	50	5.2975	349	181	80	36	24	9	4	5				
	60	5.3020	1046	667	188	129	15	13	8					

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION A-9</u>														
8 Nov. 0630	0	5.5465	1492	726	343	256	67	38	25	3	12	5	9	4
	15	5.5820	464	162	154	52	41	19	5	11	4			
	25	5.3243	943	488	238	106	44	20	14	14				
	30	5.2868	1078	711	192	109	10	22	12	5	2			
	40	5.1922	610	264	139	134	47							
<u>STATION A-10</u>														
8 Nov. 0800	0	4.6468	1048	539	179	132	102	29	24	24				
	15	4.7714	766	477	90	120	18	20	21	5	3	2		
	20	5.3094	1353	844	261	124	18	28	35	13				
	25	4.7681	1110	460	342	188	33	31	18					
	30	4.8430	4693	2574	1148	516	247	81	41	15	21	12	18	3
<u>STATION A-11</u>														
8 Nov. 0930	0	5.7269	2182	236	855	680	37	182	15	78				
	5	5.6677	2958	941	1072	459	231	144	17	43				
	10	5.6661	2530	741	1063	338	171	49	60	5				
	15	5.6380	3178	1002	1240	483	122	155						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION A-12</u>														
8 Nov. 1045	0	5.6933	4326	381	1036	2199	911	9						
	5	5.6988	5829	878	2174	1376	721	331						
	10	5.8145	7650	44	3369	2082	485	385	80	86				
<u>STATION B-1</u>														
8 Nov. 1230	0		6330	2596	1564	1433	209	275	10					
	5		3319	84	1280	986	433	273	58	50				94
	10		4780	767	1815	1353	537	2						
<u>STATION B-2</u>														
8 Nov. 1330	0	5.5915	1376	199	453	459	68	68	18					
	10	5.7574	1307	209	640	337	94	5						
	15	5.5941	1880	614	509	465	130	35	8					
	20	5.7033	1520	577	492	275	10							
<u>STATION B-3</u>														
8 Nov. 1430	0	5.7088	1549	782	391	250	26	19	14					
	10	5.6844	1498	821	320	188	28	26	50	5				
	20	5.7517	1873	1132	388	190	49	48	10					
	25	5.7110	2097	1196	416	319	89							

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
8 Nov 1545				<u>STATION B-4</u>										
	0	5.6524	1120	265	439	250	75							
	20	5.5562	1214	278	544	297	9							
	25	5.4198	1650	712	532	267	54	20	6					
	30	5.4221	1978	1346	301	191	39	58						
	40	5.3826	1772	1054	431	127	86	15	20	8				
	45	5.1805	1947	1031	454	304	62	28	10					
	50	5.1805	3529	2032	762	424	122	2						
8 Nov. 1715				<u>STATION B-5</u>										
	0		1070	496	304	147	28	31	10					
	15		2856	1630	757	271	107	24	18					
	45		1692	1083	347	156	45	6						
	55		1546	739	441	218	69	34						
	60		2524	1182	749	290	166	73						
	70		2763	1245	890	507	132							
8 Nov. 1900				<u>STATION B-6</u>										
	0	5.4773	1254	773	281	115	23	24	4					
	35	5.6553	1197	820	235	70	28	3						
	45	5.5769	1338	1036	181	51	38							
	65	5.4756	1350	980	221	86	15	3						
	70	5.5094	2571	1480	696	252	54	35						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
8 Nov. 2100				STATION B-7										
	0	5.7849	1078	687	221	89	35							
	25		1212	784	229	110	36	17	10					
	50	5.4010	2100	1126	608	241	49	30	21					
	60	5.4486	1845	1110	434	205	47	8						
	70	5.1848	1988	1139	429	295	27	34	19	23	8			
	90	4.3253	4714	3346	778	377	138							
	100	3.9902	2021	1160	520	226	29	37	8					
8 Nov. 2300				STATION B-8										
	0	5.6018	1415	938	261	105	45	10						
	30	5.6157	896	550	161	104	23	19	1					
	60	4.8136	1010	471	348	111	31	14	8					
	75	4.6346	1577	978	344	157	15	18	14	10				
	80	4.2526	1756	1140	304	195	62	14	3					
9 Nov. 0200				STATION B-9										
	0	5.6928	1166	652	270	94	64	9						
	20	5.4843	1035	504	251	150	33	4						
	40	5.6986	1444	822	320	170	35	40	5					
	60	5.3790	890	479	136	132	71	3						
	80	5.2945	1446	490	264	73	20	56						



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
9 Nov. 0322	0 20 40 50 75 100	5.7743 5.7011 5.7354 5.4366 5.4838 4.8694	698 1136 744 1368 1236 1160	STATION B-10										
				218	191	156	43	22	22	1				
				613	236	157	29	33	14	22				
				328	202	80	36	47			2			
				588	416	216	30	8						
				527	306	212	70	37	38	6				
9 Nov. 0531	0 20 40 60 80	5.4943 5.6438 5.5899 5.4370 5.3888	1113 489 1230 3136 893	STATION B-11										
				620	219	133	78							
				110	139	134	5							
				794	182	122	58	11						
				2087	544	311	107	15						
				452	216	107	32	9						
9 Nov. 0704	0 15 40 60 75 85 95	5.5561 5.5637 5.4235 5.4039 4.9455 4.8843 4.6589	1384 2241 1470 1905 1742 2760 2778	STATION B-12										
				870	194	152	83							
				1508	310	217	67	28	17					
				884	282	146	68	9						
				1289	312	145	76	8						
				1053	301	206	84	10						
				2024	222	316	76	4						
1659	440	347	128	95	10									

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
9 Nov. 0704				<u>STATION B-13</u>										
	0	5.6273	2072	1334	369	175	86	12						
	30	5.5276	2037	963	512	250	152	49	35					
	60	5.0902	2460	1397	606	252	64	47	41					
9 Nov. 1020				<u>STATION C-1</u>										
	0	5.8886	2532	1875	326	203	32	26	9					
	20	5.6744	1358	923	181	141	13	39	1					
	70	5.1446	1684	1220	205	139	46	17	13					
	75	5.0665	1000	683	133	106	35	6						
	90	4.7116	1406	734	331	237	28	35						
9 Nov. 1158				<u>STATION C-2</u>										
	0	5.0735	1859	1377	176	163	54	23	18	5				
	20	5.4261	2006	1503	240	118	73	11						
	35	4.7326	2358	892	832	377	165	12						
	55	5.0529	1205	868	207	62	21	11						
	80	4.0654	956	635	169	76	28	13						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
9 Nov. 1338				STATION C-3										
	0	5.8262	3168	2139	531	265	84	52	37	4				
	35	5.7141	1950	1105	447	215	76	42	17	2				
	40	5.6281	1896	1185	473	147	24	21	10					
	70	4.0485	899	640	62	102	53							
	80	3.5742	818	546	154	45	38	7						
9 Nov. 1522				STATION D-1										
	0	5.8294	1366	791	202	200	53	23	18	18				
	10	5.8681	1939	1206	360	173	87	5						
	40	5.6652	1515	1079	223	135	8							
	45	5.2504	1443	1116	167	80	36	1						
	50	4.7459	641	412	127	62	2							
	60	4.4597	920	638	148	76	3							
9 Nov. 1710				STATION D-2										
	0	5.8642	1170	700	203	137	55	3						
	10	5.9840	748	430	152	75	15							
	60	4.4964	1395	1068	145	87	32	26	3					
	80	4.2161	472	280	36	86	5							
	90	3.5203	352	194	30	55	17	10						
	95	3.5810	304	183	42	31	21							
	100	3.0412	516	354	76	58	17	3						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
9 Nov. 1901				<u>STATION D-3</u>										
	0	5.9075	1066	648	197	62	25	.46						
	15	6.0049	950	649	118	61	43	6						
	30	5.9599	1766	1066	288	142	84	50						
	40	5.8367	511	278	145	25	20	10						
	45	5.8228	435	313	39	38	18	5						
	50	5.3460	360	226	27	58	14	10						
	75	4.1650	396	273	54	35	10							
	100	4.7434	238	164	18	31	8							
9 Nov. 2039				<u>STATION E-1</u>										
	0	5.8892	1138	710	173	128	24	18	15					
	20	5.4294	1566	1197	161	120	8							
	30	5.7130	1137	916	77	77	30	2						
	40	5.0766	351	239	38	24	6							
	50	4.5290	450	278	88	44	16	3						
	70	4.0530	252	165	32	26								
	100	3.3431	272	167	46	16	21							

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height											
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	
9 Nov. 2214				<u>STATION E-2</u>											
	0	5.8192	747	445	145	79	18								
	10	5.8061	871	500	203	72	28	22	10						
	20	5.7678	417	218	76	59	24	10							
	30	5.6716	465	241	81	74	11								
	40	5.3577	404	235	55	49	24	22							
	70	4.2371	404	247	66	50									
	100	3.3087	688	477	91	66	17								
9 Nov. 2325				<u>STATION E-3</u>											
	0	6.0372	677	464	64	68	10								
	5	5.2403	791	595	92	41	19	19							
	10	5.1841	532	347	61	44	33	10							
	20	5.7457	388	224	49	60	8								
	30	5.7498	856	644	48	78	22	10							
	40	5.4026	785	528	111	94									
	50	5.5433	864	621	111	40	24	34	5						
	60	4.2710	334	202	63	34	3								
10 Nov. 0110				<u>STATION E-4</u>											
	0		1010	473	270	142	15	38	9						
	20		760	501	134	60	20	16	14						
	60		1390	874	242	171	46	18	23						
	65		1180	672	217	167	67								
	70		1807	1126	314	217	81	5							



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
STATION E-5														
10 Nov. 0246	0	5.7923	1382	802	299	77	71	37	1					
	10	5.5200	1336	851	238	51	105	15	15					
	40	5.4325	614	295	171	82	18	1						
	45	5.1254	1010	600	162	137	60							
	50	5.1420	2346	1414	419	313	92							
STATION E-6														
10 Nov. 0405	0	5.7316	1143	667	216	130	22	23	1					
	15	5.7272	844	439	155	138	42	1						
	25	5.3896	994	676	145	103	37							
	30	5.3222	1198	712	254	123	53							
STATION E-7														
10 Nov. 0511	0	5.6988	1186	748	170	130	32	18	12					
	10	5.6585	1003	560	158	173	34	1						
	15	5.5410	864	557	158	88	16	5						
	20	5.5158	730	505	101	53	24	2						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height																
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100						
<u>STATION F-1</u>																				
10 Nov. 1113	0	5.8144	1292	727	233	135	86													
	10	5.7397	1041	552	137	45	80	4												
	20	5.8335	918	495	162	155	20	18												
	25	5.7170	942	444	262	118	42	24	8											
<u>STATION F-2</u>																				
10 Nov. 1236	0	5.5448	1549	900	194	299	50	12												
	15	6.0371	1699	950	294	264	84	3												
	20	5.6900	2208	1066	571	311	113													
	25	5.6768	2101	701	263	576	203	27	161	91										
<u>STATION F-3</u>																				
10 Nov. 1345	0	5.8273	1960	966	472	312	110	3												
	5	5.9422	3936	1979	958	666	154	60	18	53										
	10	5.9603	4314	2032	1153	647	284	37	74											
	15	5.8268	4843	2664	487	1212	286	59	61	5										
<u>STATION G-1</u>																				
10 Nov. 1450	0	5.9840	1430	989	193	109	39	6												
	20	5.8898	1135	827	154	73	31	9												
	30	5.6948	1684	1063	225	201	98	16	38											
	40	5.6323	2187	1272	342	308	127	78												

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height									
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
STATION G-2													
10 Nov. 1600	0	5.8148	1647	1130	268	102	22	24					
	15	5.2417	1322	1045	111	94	3						
	20	5.5762	949	634	136	91	19	7					
	25	5.3972	1146	803	202	70	32	11					
	40	5.3294	3571	2177	607	493	127	34	73				
STATION G-3													
10 Nov. 1745	0	5.8926	1131	754	128	130	16						
	25	5.8895	1259	862	185	85	30	10					
	35	5.7870	606	422	86	34	34						
	45	5.6851	1014	802	99	35	11						
	60	5.2915	564	403	60	52	4						
	65	5.1268	2384	1697	383	158	78	18	15				
	70	4.9629	1677	1146	273	160	44	9					
	80		1189	787	145	118	28	32					
STATION G-4													
10 Nov. 1920	0	5.8462	803	689	72	93	16						
	40	3.3941	774	559	48	77	51						
	65	4.1181	1574	1257	143	102	26	5					
	70	3.6541	1813	1270	242	171	60						
	90	2.6533	1903	1314	263	161	88						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION G-5</u>														
10 Nov. 2145	0	5.9478	1186	786	113	166	8							
	40	5.2305	532	398	44	23	14	15						
	50	4.1112	424	261	37	71	10							
	60	3.3104	418	341	55	65	33							
	75	3.1445	1514	965	268	154	66							
	95	3.2224	1000	574	198	156	31							
<u>STATION G-6</u>														
10 Nov. 2343	0	5.7508	1268	961	133	78	8	32	6	19	2	15	5	9
	30	5.7872	936	747	60	67	23							
	60	3.4342	927	635	159	75	16	19	9	5				
	90	3.2662	663	392	145	78	14	22	2					
	100	3.1061	653	201	264	102	43	12	9	10	3			
<u>STATION G-7</u>														
11 Nov. 0143	0	5.9317	320	185	75	25	6	18						
	10	5.9581	360	207	77	40	8	10	5					
	20	5.8906	786	576	77	74	7	14						
	30	5.8764	1245	873	257	61	6	17	13					
	60	4.0466	854	589	136	72	22							
	100	3.2441	1122	737	222	89	18	10						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION H-1</u>														
11 Nov. 0559	0	5.6899	1378	924	210	78	69	36	18	9				
	15	6.0817	1035	751	92	119	18	13	4					
	25		1032	719	120	101	6							
	35	5.6355	582	401	70	54	17	6	15					
	100	3.8533	176	48	55	19	7	7						
<u>STATION H-2</u>														
11 Nov. 0817	0	5.9058	1500	892	249	158	83	32	11	29	4	5	18	2
	15	5.7390	1077	562	242	96	93	17	15	17	3			
	30	5.5778	900	582	134	115	24	15						
	50	5.3898	324	94	133	48	26	6						
	100	3.2146	173	69	39	33	5	10	8					
<u>STATION I-1</u>														
11 Nov. 1123	0	5.3032	1193	874	162	94	22							
	30	4.9591	674	543	96	79	4							
	35	4.4959	531	219	116	133	4							
	40	4.2616	1265	760	254	165	33	19	12	8				
	70	4.0148	2680	1173	828	453	104	53	13	17	7	22		
	75	3.2128	1132	214	461	275	108	40						



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height									
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90
<u>STATION I-2</u>													
11 Nov. 1310	0	5.7718	1123	728	203	105	15	31	2				
	20	5.7202	826	586	83	92	15	21					
	35	5.1128	1620	695	395	315	140	32	10				
	45	5.0003	2344	1486	443	271	86	23	15	9			
	50	4.9365	1731	787	551	280	44	32	18				
	75	4.6648	2394	1181	684	357	106	29	12	7	9	1	
<u>STATION I-3</u>													
11 Nov. 2040	0	5.7708	1080	479	264	174	66	4	6	19	28		
	15	5.7045	686	517	73	49	11	14					
	30	5.5015	316	149	70	51	20	5					
	40	4.8643	364	114	167	30	22	16					
	55	4.1251	3671	2412	758	350	69	32	11	17	11		
	75	4.0459	3312	1716	944	460	96	43	32	6	4	4	
<u>STATION I-4</u>													
11 Nov. 2158	0	5.7422	1238	723	254	135	43	19	5	17			
	10	5.4817	1082	680	180	120	28	27	3	8	2	12	
	25	5.7084	954	667	156	67	15	21	6				
	35	5.9037	547	362	81	34	38						
	40	5.7202	1004	771	90	78	17	23	7				
	45	5.2979	468	311	51	51	18	3	13	6			
	55		2212	1295	537	211	81	46	12	9			
	75	3.9886	3183	2034	615	343	97	45	19	4			

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION I-5</u>														
11 Nov. 2328	0	5.9192	1635	1007	313	173	39	35						
	10	6.3898	987	644	169	84	23	25						
	30	5.7838	348	181	78	44	3	23						
	50	5.3388	793	459	170	100	24	9	7					
	55	4.9881	1659	932	397	195	70	23						
	60	4.9915	2094	1072	566	297	80	19	30	11	2	8		
<u>STATION I-6</u>														
12 Nov. 0453	0	5.9092	701	318	179	94	16	16	39					
	15	6.0033	758	504	130	57	5	19	5	5	8	6		
	30	5.6359	846	643	77	54	20	13	7					
	45	5.4080	1694	681	602	211	122	14	23	8				
	55	5.5188	1996	1287	330	257	49	14						
<u>STATION I-7</u>														
12 Nov. 0601	0	5.7757	1442	913	275	116	44	3						
	15	5.8484	1365	938	186	136	30	5						
	40	5.5250	1220	776	188	168	9							
	50	5.4211	2231	1184	509	327	98	38						
	60	5.5221	2650	1600	465	392	84	34	1					

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION I-8</u>														
12 Nov. 0714	0	5.8855	2052	1053	430	314	109	5						
	10	5.8536	1918	1190	338	221	36	25						
	25	5.7810	1801	1121	348	183	81	4						
	35	5.5812	3151	2032	541	350	128	28						
<u>STATION I-9</u>														
12 Nov. 0822	0	5.5168	1482	843	224	229	76	33						
	5	5.6455	1623	1102	253	154	35							
	10	5.4379	2052	1425	318	167	55							
	25	5.5358	1940	1306	236	270	57	29						
<u>STATION J-1</u>														
12 Nov. 0934	0	5.7702	3195	2147	552	341	70	9						
	8	5.57765	3181	2052	633	336	77	33	3					
	15	5.5527	3417	1872	605	598	152							
	22	5.6506	3358	1818	683	496	206	48	33					
<u>STATION J-2</u>														
12 Nov. 1041	0		798	507	91	110	20	4						
	10		945	564	115	135	42	7						
	20		1328	915	140	159	33							
	30		2458	1627	463	243	62	9						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
STATION J-3														
12 Nov. 1222	0	5.7087	882	527	95	133	71	2						
	15	5.7373	442	297	42	27	34	8						
	30	5.6713	732	541	47	93	27							
STATION J-4														
12 Nov. 1336	0	5.8639	5898	3519	1355	686	185	26	50					
	8	5.9689	6364	4430	1030	652	59	94	6					
	15	6.0066	4304	2482	988	517	152	87						
	30	5.6495	2682	1263	557	537	189	23	35	10				
STATION K-1														
12 Nov. 1423	0	5.7585	1008	662	196	84	51							
	15	5.7588	1068	627	223	88	62	5						
	25	5.6769	1076	779	152	86								
	34	5.4571	3607	2507	657	286	86	11						
STATION K-2														
12 Nov. 1506	0	5.8219	1904	1338	267	182	26	8						
	20	5.7306	2019	1438	296	138	78							
	40	5.4078	2690	2154	286	144	27	1						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height															
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100					
12 Nov. 1546	0	5.7091	854	495	219	90	11	12											
		5.7305	668	369	155	87	16	8	13										
		5.7021	970	110	307	363	69	45	17										
		STATION K-3																	
12 Nov. 1641	0	5.7503	876	418	224	133	19	39	8	2	14	10							
		5.7163	468	174	13	198	39	12											
		5.6849	665	227	126	98	39	10	8										
		5.2081	2152	908	743	308	116	39	7	8									
12 Nov. 1736	0	5.8752	708	251	236	82	56	11	32	6	14								
		5.7594	469	168	148	81	20	13											
		5.4497	1283	837	264	96	31	13	24										
		STATION K-5																	
12 Nov. 1919	0	5.7572	934	33	419	246	105	56	12	20	2								
		5.7494	1032	435	295	169	44	17	23	13	5								
		5.3999	601	70	261	164	39	12	24	10									
		4.9300	3390	1701	922	564	116	26	29	16									



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION K-6A*</u>														
13 Nov. 2208	0	5.8314	4373	2187	491	1004	238							
	10	6.0388	4648	2126	1074									
	25	5.4876	3700											
	40	5.2064	4279											
	50	4.8523	1929											
<u>STATION K-7</u>														
13 Nov. 2101	0	5.9091	970	413	291	157	29	28	20	14				
	20	5.7318	1280	412	561	225	30	19	17					
	30	5.1584	1882	372	877	395	98	39	11					
	40	4.9580	2476	182	1251	734	101	121	13					
	50	4.7655	2006	283	933	441	197	61	41	14	8			
<u>STATION K-8</u>														
12 Nov. 2051	0	5.9493	1432	143	525	418	143	41	29	24	11			
	15	5.8990	806	190	324	14	139	53	24	9	11			
	40	5.0025	673	330	162	81	42	17						
	55	4.2849	2044	778	753	362	59	26	32	4	17			
	65	4.4447	1434	800	322	160	20	59	13	40				

\* None of these samples appeared to have any iodine solution

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION K-9</u>														
12 Nov. 2206	0	5.9654	983	0	447	298	97	28	29	6				
	15	5.7151	723	227	217	140	66	43						
	30	4.6923	509	197	137	78	22	18	18	6				
	40		1030	609	232	110	40	12						
	60	4.1704	1969	1168	455	241	39	41	2	13				
<u>STATION K-10</u>														
12 Nov. 2328	0	5.9810	839	0	305	275	65	50	20	35	19			
	20	5.7935	434	86	102	134	28	43						
	40	4.3258	480	194	146	87	15	17						
	50	3.6722	1640	853	436	232	57	37	3					
	85	3.5258	2345	1414	514	225	103	54	10	5				
<u>STATION K-11</u>														
13 Nov. 0139	0	5.9264	1070	470	324	144	29	32	8					
	20	5.9065	430	126	113	80	60	7	3					
	40	5.6511	367	213	56	51	13	10	9					
	65	4.9955	393	251	93	19	6							
	85	3.9190	170	89	34	24	16							
	100	3.9735	333	217	76	9	7							

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
13 Nov. 0316				<u>STATION L-1</u>										
	0	5.9963	640	85	218	146	50	51	7	21	11			
	20	4.6692	474	195	110	82	35	17	14					
	40	5.5918	334	132	74	75	27	5						
	70	3.4484	330	164	81	44	13	1						
	100	4.1597	614	361	83	96	23	7						
13 Nov. 0518				<u>STATION L-2</u>										
	0	5.6537	668	341	159	106	42	2						
	20	5.7330	697	458	90	89	21							
	35	4.5987	404	205	104	38	28	14	7					
	50	3.9404	980	600	204	119	33							
	80	3.6587	2305	1086	763	278	88	46						
	100		846	479	198	94	19	24	5					
13 Nov. 0712				<u>STATION L-3</u>										
	0	5.8992	724	141	281	125	39	19	31	22	23			
	20	4.1920	785	484	113	96	40	12	9					
	35	3.8200	900	444	255	114	37	8	11					
	60	3.7890	1088	697	209	93	34	8	13	15				

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
13 Nov. 0849				<u>STATION L-4</u>										
	0	5.8400	933	51	309	252	117	84	35					
	15	5.8525	934	498	199	108	37	30	14	10				
	30	6.0081	336	159	87	53	13							
	45	5.1028	1388	540	494	211	71	16	18	5				
13 Nov. 1006				<u>STATION M-1</u>										
	0	6.3528	1182	240	380	286	81	98	7					
	10	6.3951	1530	639	336	269	50	68	13					
	20	6.0460	1024	424	306	159	61	10	23	15				
	28	5.6755	750	424	161	94	36	8						
35	5.3593	1134	630	268	143	38	21							
13 Nov. 1157				<u>STATION M-2</u>										
	0	6.0616	1297	402	383	270	73	40	40					
	10	6.0128	1136	308	418	218	37	52	14					
	15	5.6363	726	374	191	92	30	6						
	25	5.4082	1106	524	337	159	41	18						
	35	5.2560	1832	811	580	294	70	27	10					
38	5.2421	1800	694	554	359	107	24	18						

TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
STATION M-3														
13 Nov. 1437	0	6.0139	1010	351	257	168	83	51						
	5	5.9696	956	336	305	165	37							
	15	5.9298	698	135	244	134	55	22	22	10				
	25	5.6263	822	238	217	199	63							
STATION M-4														
13 Nov. 1539	0	5.9312	921	411	296	108	23	21	13	21				
	10	5.9201	699	267	240	77	61	9	9					
	15	5.5297	1854	794	579	306	81	38	13	14				
	25	5.3570	2295	1145	686	302	88	24	11					
STATION M-5														
13 Nov. 1654	0	6.1033	700	38	307	197	43	49	28					
	4	6.0159	1336	286	469	275	153	67	19	22				
	10	5.7209	916	327	146	76	36	7	9	13				
	20	5.6830	586	180	202	87	46	24	2					
	30	5.0842	1621	519	564	362	83	49	13	6				
STATION M-6														
13 Nov. 1810	0	5.9541	1130	200	510	232	94	44						
	8	5.9185	943	87	231	126	22	24	19	5				
	15	5.9353	420	110	151	71	19	9	8	24				
	28	5.3799	1062	528	224	206	43	32						



TABLE 2 (Cont.)

Date Time	Sample Depth	Oxygen (ML/L)	Total Count at Threshold Zero	Relative Pulse Height										
				0-5	5-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<u>STATION M-7</u>														
13 Nov. 1916	0	5.9988	599	18	275	173	61	3						
	15	5.8522	311	45	94	89	11	13	15		10			
	20	5.7203	494	156	112	135	22	10						

## BIBLIOGRAPHY

1. Ball, T. F. and LaFond, E. C., Shallow-Water Turbidity Studies, Naval Electronics Laboratory Report 1129, 26 July 1962. 26 p.
2. Barham, E. G., Wilton, J. W. and Sullivan, M. P., Plankton and Turbidity, Naval Electronics Laboratory Report 1386, 1 July 1966. 68 p.
3. Bassett, C. H., and Furminger, H. C., An Investigation of the Vertical Variation of Light Scattering in Monterey Bay, California, M. S. Thesis, Naval Postgraduate School, 1965. 88 p.
4. Beer, R. M., Suspended Sediment over Redondo Submarine Canyon and Vicinity, Southern California, Office of Naval Research Report Number USC Geology 69-4, June 1969. 58 p.
5. Bolin, R. L., Hydrographic Data from the Area of the Monterey Submarine Canyon, 1951-1955, Hopkins Marine Station, Stanford University Final Report, July 30, 1964. 101 p.
6. Carritt and Carpenter, "The Winkler Method," Journal of Marine Research 24(3), 286-318 (15 September 1966).
7. Carter, R. C. and Kaymierczak, E. J., Special Oceanographic Studies, State of California, State Water Quality Control Board, San Francisco Bay-Delta Water Quality Control Program, Final Report Task VII-1a, 15 June 1968. 322 p.
8. Duntley, S. Q., "Light in the Sea," Journal of the Optical Society of America 53(2), 214-233, (February 1963).
9. Gatzke, P. H. and Pizinger, D. D., Bottom Current Measurements in the Head of Monterey Submarine Canyon, M.S. Thesis, Naval Postgraduate School, 1965. 61 p.
10. Jerlov, N. G., "Maxima in the Vertical Distribution of Particles in the Sea," Deep Sea Research 5, 173-184 (1959).
11. Jerlov, N. G., Optical Oceanography, Elsevier, Amsterdam, London, New York, 1968. 194 p.
12. Joseph, J., "Extinction Measurements to Indicate Distribution and Transport of Water Masses," Proceedings of the UNESCO Symposium on Physical Oceanography, Tokyo, p. 59-75, 1955.
13. Ketchum, B. H. and Shonting, D. H., Optical Studies of Particulate Matter in the Sea, Woods Hole Oceanographic Institution Report 58-15, February 1968. 10 p.

14. Labyak, P. S., An Oceanographic Survey of the Coastal Waters Between San Francisco Bay and Monterey Bay, California, M.S. Thesis, Naval Postgraduate School, October 1969, 317 p.
15. Leipper, D. F., "Sea Temperature Variations Associated with Tidal Currents in Stratified Shallow Water over an Irregular Bottom," Journal of Marine Research 14, 234-252, (1955).
16. Leroy, C. C., "Development of Simple Equations for Accurate and More Realistic Calculations of the Speed of Sound in Seawater," The Journal of the Acoustical Society of America 46, 216-226 (1969).
17. Lovett, J. R., "Comments Concerning the Determination of Absolute Sound Speeds in Distilled and Seawater and Pacific Sofar Speeds," The Journal of the Acoustical Society of America 45(4), 1051-1055 (April 1969).
18. Lovett, J. R., "Determination of Salinity from Simultaneous Measurements of Sound Velocity, Temperature, and Pressure," Limnology and Oceanography 13, 557-559 (1968).
19. Skogsberg, T., "Hydrography of Monterey Bay, California, Thermal Conditions, 1929-1933," Transactions of the American Philosophical Society, v. 29, December 1936. 152 p.
20. Stevenson, R. E., An Investigation of Nearshore Ocean Currents at Newport Beach, California, Los Angeles, California, 21 December 1958. 108 p.
21. Wilson, W. D., "Extrapolation of the Equation for the Speed of Sound in Sea Water," Journal of the Acoustical Society of America 34(6), p. 866 (June 1962).
22. Yeske, L. A. and Waer, R. D., The Correlation of Oceanic Parameters with Light Attenuation in Monterey Bay, California, M.S. Thesis, Naval Postgraduate School, 1968. 144 p.

# INITIAL DISTRIBUTION LIST

	No. Copies
1. Defense Documentation Center Cameron Station Alexandria, Virginia 22314	20
2. Library, Code 0212 Naval Postgraduate School Monterey, California 93940	2
3. Department of Oceanography Naval Postgraduate School Monterey, California 93940	3
4. Naval Weather Service Command Washington Navy Yard Washington, D. C. 20390	1
5. Officer in Charge Fleet Numerical Weather Facility Naval Postgraduate School Monterey, California 93940	1
6. Commanding Officer and Director Naval Undersea Research & Development Center Attn: Code 2230 San Diego, California 92152	1
7. Director, Naval Research Laboratory Attn: Tech. Services Info. Officer Washington, D. C. 20390	1
8. Office of Naval Research Department of the Navy Washington, D. C. 20360	1
9. Commander, Air Weather Service Military Airlift Command U. S. Air Force Scott Air Force Base, Illinois 62226	2
10. Department of Commerce, ESSA Weather Bureau Washington, D. C. 20235	2
11. Oceanographer of the Navy The Madison Building 732 N. Washington Street Alexandria, Virginia 22314	1

12. Naval Oceanographic Office 1  
Attn: Library  
Washington, D. C. 20390
13. National Oceanographic Data Center 1  
Washington, D. C. 20390
14. Mission Bay Research Foundation 1  
7730 Herschel Avenue  
La Jolla, California 92038
15. Director, Maury Center for Ocean Sciences 1  
Naval Research Laboratory  
Washington, D. C. 20390
16. Mr. Roswell W. Austin 1  
Visibility Laboratory  
Scripps Institution of Oceanography  
La Jolla, California 92037
17. Mr. Thomas E. Bailey 1  
Central Coastal Regional Water Quality Control Board  
1108 Garden Street  
San Luis Obispo, California 93401
18. Dr. George F. Beardsley 1  
Department of Oceanography  
Oregon State University  
Corvallis, Oregon 97331
19. Captain S. I. Bobczynski 1  
Pacific Support Group  
Naval Oceanographic Office  
San Diego, California 92152
20. Dr. Wayne V. Burt 1  
Department of Oceanography  
Oregon State University  
Corvallis, Oregon 97331
21. Dr. Peyton Cunningham 6  
Department of Physics  
Naval Postgraduate School  
Monterey, California 93940
22. Mr. Fred H. Dierker 1  
Regional Water Quality Control Board  
364 Fourteenth Street  
Oakland, California 94612
23. Dr. Seibert Q. Duntley 1  
Visibility Laboratory  
Scripps Institution of Oceanography  
La Jolla, California 92037



24. Mr. George Eck 1  
Naval Air Development Center  
Johnsville, Warminster, Pennsylvania 18974
25. Mr. Gary Gilbert 1  
Stanford Research Institute  
Menlo Park, California
26. Dr. Eugene C. Haderlie 1  
Department of Oceanography  
Naval Postgraduate School  
Monterey, California 93940
27. Dr. R. C. Honey 1  
Stanford Research Institute  
Menlo Park, California
28. Dr. Dave Allen 1  
Pacific Support Group  
Naval Oceanographic Office  
San Diego, California 92152
29. Professor Alexandre Ivanoff 1  
Laboratoire d'Océanographie Physique  
de la Faculte des Sciences de Paris  
9, Quai Saint-Bernard  
Paris (V<sup>O</sup>), France
30. Dr. N. G. Jerlov 1  
Institute for Physical Oceanography  
Solvgade 83K  
Copenhagen, K, Denmark
31. LT Peter S. Labyak, USN 1  
USNS DUTTON (T-AGS 22)  
Fleet Post Office  
New York, New York 09501
32. Mr. Kenneth V. Mackenzie 1  
Ocean Sciences Department - Code D503  
Naval Undersea Research & Development Center  
San Diego Division  
San Diego, California 92152
33. Dr. Robert E. Morrison 1  
Tracor, Inc.  
1735 I Street, N.W.  
Washington, D. C. 20006
34. Mr. Jerry Norton 1  
Oceanography Department  
Naval Postgraduate School  
Monterey, California 93940

35. Mr. Larry Ott 1  
Naval Air Development Center  
Johnsville, Warminster, Pennsylvania 18974
36. Mr. Robert Owen 1  
U. S. Bureau of Commercial Fisheries  
La Jolla, California
37. Dr. John H. Phillips 2  
Hopkins Marine Station  
Pacific Grove, California 93950
38. Mr. James Reese 1  
Ocean Sciences Department - Code D503  
Naval Undersea Research & Development Center  
San Diego Division  
San Diego, California 92152
39. Mr. Thomas J. Shopple 1  
Naval Air Development Center  
Johnsville, Warminster, Pennsylvania 18974
40. Mr. Glenn Sorenson 1  
Stanford Research Institute  
Menlo Park, California
41. Dr. Warren Thompson 1  
Department of Oceanography  
Naval Postgraduate School  
Monterey, California 93940
42. Dr. E. B. Thornton 1  
Department of Oceanography  
Naval Postgraduate School  
Monterey, California 93940
43. Professor S. P. Tucker 6  
Department of Oceanography  
Naval Postgraduate School  
Monterey, California 93940
44. Mr. B. L. Kolitz 1  
Department of Mathematics  
Naval Postgraduate School  
Monterey, California 93940
45. Mr. John E. Tyler 1  
Visibility Laboratory  
Scripps Institution of Oceanography  
La Jolla, California 92037
46. Mr. Lowell Van Billiard 1  
Naval Ships Engineering Center  
Prince Georges Center  
Hyattsville, Maryland 20782

47. Mr. Raymond Walsh 1  
 San Francisco Bay-Delta Water Quality  
 Control Program  
 Resources Building, Room 144  
 1416 Ninth Street  
 Sacramento, California 95814
  
48. LCDR Lanny A. Yeske 1  
 USS BAYA, Fleet Post Office  
 San Francisco, California 96601
  
49. LCDR Robert E. Baker, USN 3  
 U. S. Fleet Weather Central  
 COMNAVMARIANAS  
 Fleet Post Office, San Francisco 96630
  
50. Dr. Paul Titterton 1  
 Sylvania Electronic Systems - Western Division  
 P. O. Box 188  
 Mountain View, California 94040
  
51. Mr. R. J. Callaway 1  
 200 S. 35th Street  
 Pacific Northeast Water Laboratory  
 Corvallis, Oregon 97330
  
52. Mr. Alan Baldrige, Librarian 1  
 Hopkins Marine Station  
 Pacific Grove, California 93950
  
53. Mr. Ted Petzold 1  
 Visibility Laboratory  
 Scripps Institution of Oceanography  
 La Jolla, California 92037
  
54. Dr. Gary Griggs 1  
 Division of Natural Sciences - II  
 University of California, Santa Cruz  
 Santa Cruz, California 95060
  
55. Director, Moss Landing Marine Laboratories 1  
 Moss Landing, California 95039
  
56. Miss Elsie F. DuPré 1  
 Oceanography Branch, Optical Sciences Division  
 Naval Research Laboratory  
 Washington, D. C.
  
57. Dr. Rudolph W. Preisendorfer 1  
 Department of Mathematics  
 Naval Postgraduate School  
 Monterey, California 93940

58. Mr. W. J. Stachnik  
Optical Systems, U. S. Navy Underwater Sound  
Laboratory  
Fort Trumbull  
New London, Connecticut 06320

1





## DOCUMENT CONTROL DATA - R &amp; D

*(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)*

## 1. ORIGINATING ACTIVITY (Corporate author)

Naval Postgraduate School  
Monterey, California 93940

## 2a. REPORT SECURITY CLASSIFICATION

Unclassified

## 2b. GROUP

## 3. REPORT TITLE

THE COMPARISON OF OCEANIC PARAMETERS WITH LIGHT ATTENUATION IN THE WATERS  
BETWEEN SAN FRANCISCO BAY AND MONTEREY BAY, CALIFORNIA

## 4. DESCRIPTIVE NOTES (Type of report and, inclusive dates)

Master's Thesis; April 1970

## 5. AUTHOR(S) (First name, middle initial, last name)

Robert E. Baker, LCDR, United States Navy

## 6. REPORT DATE

April 1970

## 7a. TOTAL NO. OF PAGES

206

## 7b. NO. OF REFS

22

## 8a. CONTRACT OR GRANT NO.

## b. PROJECT NO.

## c.

## d.

## 9a. ORIGINATOR'S REPORT NUMBER(S)

## 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

## 10. DISTRIBUTION STATEMENT

This document has been approved for public release and sale; its distribution  
is unlimited.

## 11. SUPPLEMENTARY NOTES

## 12. SPONSORING MILITARY ACTIVITY

Naval Postgraduate School  
Monterey, California 93940

## 13. ABSTRACT

Eighty-six oceanographic stations were occupied in the waters between Monterey Bay and San Francisco Bay during the period 7-14 November 1969. Values of beam transmittance, oxygen content, particulate count, and temperatures were obtained from the surface to 100 meters. These parameters were analyzed and compared by means of depth profiles, horizontal contours and vertical contours.

The average sea surface temperature during this period was 14.44<sup>0</sup> C. The northern part of Monterey Bay had the lowest values of beam transmittance and highest values of particulate count. The California Current appears to be flowing southward down the coast at depths above 60 meters and entering Monterey Bay where it sinks to a depth of at least 61 meters. Indications of downwelling are present off the coast between Pt. Ano Nuevo and Santa Cruz and this is attributed to the northward flowing Davidson Current impinging on the shore and sinking. A layer of maximum particulate count was often found to exist within the thermocline. A fairly good correlation seems to exist between beam transmittance and particulate count. No simple relationship between beam transmittance and oxygen content was apparent. Approximately 74 percent of all particulates observed by means of a Coulter Counter having a 100 micron orifice were less than 6.2 microns in diameter.

14

## KEY WORDS

## LINK A

## LINK B

## LINK C

ROLE

WT

ROLE

WT

ROLE

WT

Light Attenuation

Turbidity

Beam Transmittance

Particulate Matter

Temperature

Oxygen

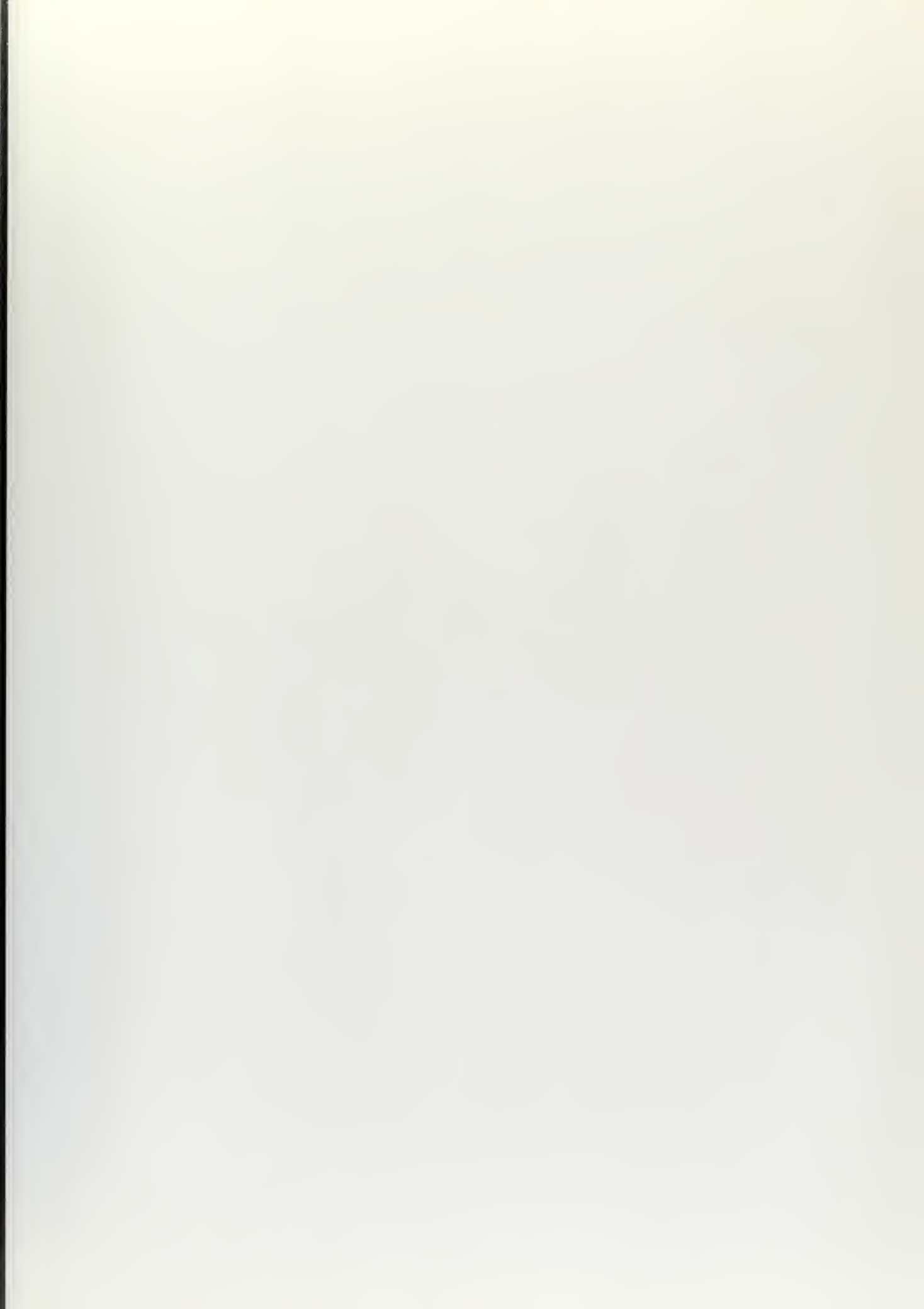
Monterey Bay, California

Central California Coastal Waters

Coulter Counter

Salinity

Sound Velocity





10 OCT 74  
15 FEB 79

10032  
22754  
25447

Thesis  
Bl72  
c.1

Baker

118431

The comparison of  
oceanic parameters  
with light attenua-  
tion in the waters  
between San Francisco  
Bay and Monterey Bay,  
California.

TH  
BL  
c.

10 OCT 74  
15 FEB 79

10032  
22754  
25447

Thesis  
Bl72  
c.1

Baker

118431

The comparison of  
oceanic parameters  
with light attenua-  
tion in the waters  
between San Francisco  
Bay and Monterey Bay,  
California.



thesB172

The comparison of oceanic parameters wit



3 2768 001 91205 8

DUDLEY KNOX LIBRARY